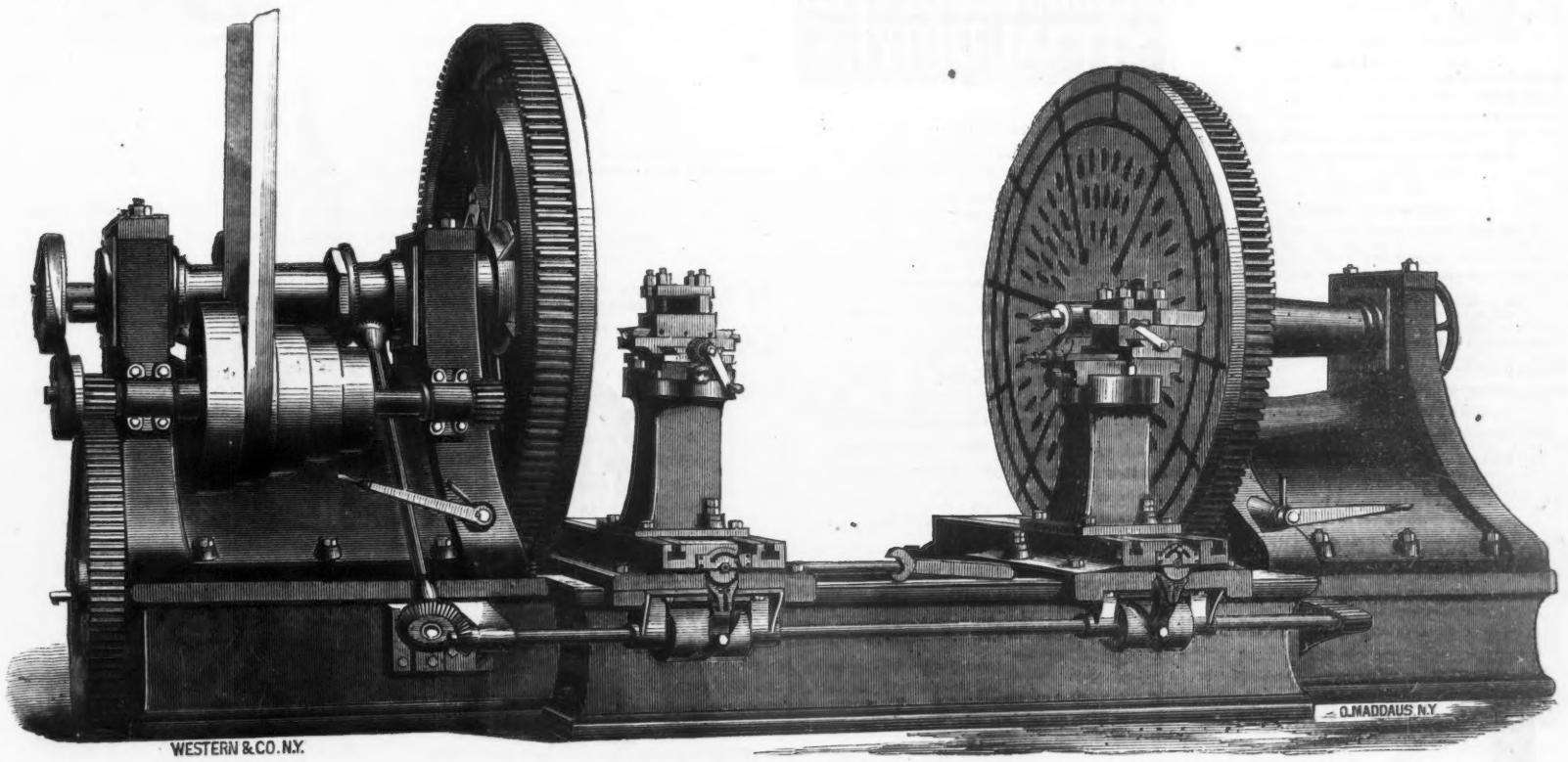
THE ENGINEERING AND MINING JOURNAL.

VOL. X.—NO. 11.—THIRD SERIES.] NEW YORK, TUESDAY, SEPTEMBER 13, 1870. [SINGLE COPIES 10 CENTS.

Driving Wheel Lathes.

WE present to our readers this week an illustration of a lathe of a new pattern, for the purpose of turning the driving-wheels of locomotives. It may readily be imagined, even by those not conversant with this subject, that a lathe for this purpose must possess great strength, to perform the work accurately. The immense weight of the driving-wheel has to be supported entirely by the face-plate of the lathe, to which it is secured. Of course heavier articles, such as cannon, are bored, and sometimes turned in lathes, but these have always two points of support. At the same time, it is necessary that the circumference of driving-wheels should be absolutely circular, as any deviation from that form would cause an unevenness and jar in running, which would continually tend to augment the original defect; so that in course of time the axle would be subjected to a severe strain. Only three or four patterns of lathes for this purpose have ever been made, and the one of which we give an illustration, manufactured by the New York Steam Engine Company, is the latest. They have, of course, the advantage of having before them the weak points of other constructions, which they have endeavored to avoid. The lathe is extremely heavy and strong, and is capable of turning the steel tires now rapidly coming into general use for locomotives. The older patterns, not having the turning of steel in view when they were constructed, were of course not intended for so severe a test.

While the design is a new one and the arrangement the most convenient, the manufacturers do not rely entirely on these points, but at the same time give to the mechanical workmanship and finishing of the parts particular care. In the old styles of lathes for this purpose the machinery for supplying the feed was overhead, and the vertical shafting, which was necessary to convey the motion to the slide-rests, was considerably in the way and liable to be injured when heavy pieces of work were handled. In this lathe, as will be seen by an inspection of the drawing, the feeding attachment is below the level of the bed-plate and entirely out of harm's way. The feed is entirely automatic, and the tool may be adjusted to work in any required direction without any change in the main feeding apparatus, which proceeds regularly, whatever the given direction of the tool may be. Both face-plates may be used at the same time, for different pieces of work requiring different speeds. As will be seen from the drawing, the face-plate on the left hand side may be driven by means of a pinion working in the outside cog-gear, or by means of the lever seen a little to the left of the face-plate, over the head-rest, this may be thrown out of gear, and the face-plate driven by a pinion working in the inside gearing. The face-plate on the right has a similar lever, by which it can be thrown in and out of gear. The arrangement of these levers is very simple and not liable to get out of order, while at the same time they perform their functions perfectly, and have been found convenient by those who have used them. All the slides are accurately fitted by scraping, and the wrought-iron work is carefully case-hardened in all places exposed to wear. Machinery made by this company may be seen at the store of GEORGE PLACE & COMPANY, Nos. 126 and 128 Chambers street, New York.



IMPROVED DRIVING-WHEEL LATHE.

Method of Testing Portland Cement.

Translated from "Die Hydraulischen Moertel" of Dr. W. MICHAELIS.
By Dr. ADOLPH OTT.

[Continued from Page 104.]

THE method indicated is to be preferred, on account of the fact that the paste made for the tests described would be too thin for the forming of balls that would retain their form. One would, therefore, have to await the moment when, by setting, a more consistent mass is produced. The right moment might in this case easily be missed, while the cohesion of the mass could then be disturbed by an untimely forming, which might cause mistakes. In going through these operations, it will readily be noticed whether a cement hardens quickly or not, and whether it grows warm or not. If the balls are carefully immersed in water when sufficiently solidified, they will show whether the cement is apt to crack open, or whether it will swell and crumble to pieces, or whether it is free from these faults, and is likely to harden gradually. The detaching of small particles immediately after the immersion is of no consequence.

If the balls are immersed too prematurely—that is, before they have sufficiently hardened—their coherence may be endangered. It is, therefore, necessary not to be too hasty with the immersing, especially as it is immaterial whether the samples are laid into the water after twenty minutes or several hours, for it is only necessary to immerse them immediately after hardening, when it is desirable to know within what time the cement is capable of resisting the water, and which among several kinds will resist best.

As formerly shown, the action of the water is at first not inconsiderable. Alkalies and lime are being dissolved, and thus the surface becomes entirely decomposed. Silicic acid, the hydrates of iron, and alumina are deposited in the form of a light, flocculent pricipitate. The presence of lime in the water may be recognized by the formation of a skin. This deportment, in consequence of which the surface of the directly-immersed samples get soft and friable, is easy of explanation, and should, therefore, be duly regarded. In the interior the mass hardens in the same manner in the air. But if the cement fails to harden in the water, and forms a soft mass of little coherence after one or two days, it is probably altogether worthless. Yet it may still harden in the course of time, and prove to be a good, although exceedingly slow hardening mortar. It is, therefore, advisable to continue the observation for some time.

The samples on stone give exact information on the adhesive quality of the cement. It shall neither detach itself in the air nor in the water if once sufficiently hard, but should adhere so firmly even after a week's time—and surely after a month—that the sample can only be separated by force from the stone, and that thereby a part of the latter, if it is burned brick, is also loosened with it. If the brick is burned rather sharply, this is hardly to be expected, but such are generally not employed for these tests. Bricks that have been burned some time are most suitable. On these samples the color which the hardened cement assumes is seen at the same time, and the same should in no case be entirely or partially yellowish-brown or rusty.

A cement which assumes this color does not possess the normal composition; it contains that pale-brown powder resulting from spontaneous crumbling, and in consequence thereof is not capable of accomplishing what may be expected of a properly mixed and burned cement.

Although the samples on the stone may show a change in volume, a cracking, swelling, or a detaching of scales, they will not exhibit significant changes in volume, which are unaccompanied by such visible phenomena. According to those tests, a cement might be considered perfectly faultless, which it may not be in fact; and it might even lead to very grave accidents if employed on a large scale.

Let us imagine a widely-stretched arch; will not an apparently insignificant swelling of a single fissure, in case of solid abutments, bring on an elevation of the whole arch, and this in the most favorable case? Will not the construction be endangered at the weakest spot?

In order to attain a sure and keen judgment in this direction, we must have recourse to the so-called glass tests, in which the smallest increase is indicated by the cracking of the glass. Small preserve glasses, 25 to 100 cubic centimetres capacity, are most suitable for this purpose; in order that they be very sensitive, only very thin glasses must be selected. In pouring the cement paste in the glass, care must be taken to expel the air as completely as possible, which is often done by knocking the glass against a somewhat yielding support, or against the palm of the hand. It is then left to harden in the air for a few days, and if exposed alternately to air and water, the most insignificant increase in volume will infallibly be indicated by a breaking of the glass.

Cements by which the glass is not cracked within four weeks may be considered sufficiently available. As, however, certain circumstances, such as admixtures of gypsum and coarse particles, may expose this deficiency at a much later time, it is advisable in all cases where the cement of a very superior quality is required, to continue with the observation of the samples in the glass for a longer period.

In order to set the quality of a cement in the proper light, the described tests are not sufficient, inasmuch as in comparative tests the preference might be given to an inferior cement, simply because it might harden a little more slowly in the air, but better in the water. The chief point in judging about a cement consists in getting acquainted with the binding quality of the pure cement, or of one mixed with sand.

On the Preparation of Specimens of Soundings for the Microscope.*

By Professor A. M. EDWARDS.

IN the course of his gatherings it not unfrequently happens that the microscopist acquires specimens of the bottom of the ocean, from various localities, which, if properly prepared, furnish him with many beautiful objects for observation and study. And the beauty of these objects, the remains of once-living organisims, are of such a marked character and present so many points for admiration that, even to the unscientific observer, they become sources of pleasure often leading to farther inquiry into their life-history, so that imperceptibly almost, and by gradual degrees, the possessor becomes a student, in fact, and is induced to follow up his investigations to some practical end.

At the present time such specimens are of special interest, on account of the remarkable revelations made by the deep-sea dredging, lately carried on upon our coast and in Europe, and the bearing of these specimens upon geology, zoology, as well as other branches of science. The immense tracts covered by what Dr. CARPENTER has characteristically termed "globigerina-mud," on account of it teeming with *Fbraminifera* so called and the connection of Professor HUXLEY'S "Coccoliths and Coccospheres," with the formation of the chalk-beds of the cretaceous, open up to the microscopists an universe of new facts for investigation. Added to these calcareous organisms, the specimens of sea-bottom presents us with siliceous forms, both animal and vegetable, of surprising delicacy and beauty of outline and structure, and it was to these last named that my attention has been more particularly turned.

Among such specimens of sea-bottom, the soundings taken at different times, and at various points on the coast of the United States by the Coast Survey, have been subjects of extreme value to the scientific observer, while they have, at the same time, furnished many unscientific possessors of microscopes with matter for admiration, wonderment, and joy; the graceful *Diatomaceæ*, the symmetrical *Radiolaria*, and marvellous *Foraminifera*, often present in such profusion, serving to enable the preparer to put up slides of surpassing beauty.

One of these soundings, for which I am indebted to the Smithsonian Institution, was of such a character that I was extremely desirous of studying as completely as possible the forms presented in it, belonging, as they did, to all of the three families mentioned, besides which it contained several minute mollusca and the remains of sponges and other organisms. It was, as shown by the remains present, of such a character as to consist essentially of calcium carbonate, commonly known as carbonate of lime, and silicon dioxide (silica), built up into the skeletons of dead organisms. The problem, then, presented to me, was to prepare it in such a way, if possible, first, to show all of these objects at the same time, or, second, to separate it into calcareous and siliceous specimens, and this last method I found, after trial, to be the best. As my mode of manipulation may hereafter be of value to others possessing similar gatherings, I will give it in detail.

The sounding, being in the shape of a dry powder of a light greyish-green color, was placed in a suitable glass vessel and moderately strong liquor potassa poured upon it. It was now boiled for a few moments, until I saw that the lumps present in it were broken up, and a light mud-like sediment was the result. The solution of potassa must be, of course, apportioned in strength to the specimen under manipulation; such as consists of many lumps and much organic matter will require it of greater strength than that which is mostly calcareous and siliceous. If it be used too strong, some of the more delicate siliceous forms will be attacked, or even, as I have occasionally found, entirely dissolved. After it had boiled for a short time, as I have said, I allowed it to stand until the mud had settled, and a tolerably clear solution was left above it. I now poured off most of the liquor potassa, and replaced it by a strong solution of chloride of soda, so-called. That sold by apothecaries under the name of "Labarraque's solution" will answer generally, and is readily procured. This I now boiled until I found its action to cease. By this means the mud is so much bleached as to become almost white. The potassa, at first, has the effect of dissolving much of the organic matter present, and thus breaking up the lumps and setting the shells free, and the chloride of soda solution bleaches them, so that we have them clean and separated to such an extent that, under the microscope, the individual shells are easily recognised. I now proceeded to separate the larger from the smaller forms by means of the "elutriation" process, which consists in first washing off thoroughly all the potassa and chloride of soda with pure filtered or distilled water, and shaking up the sediment in a glass about two inches high filled also with water. If now permitted to stand for a few seconds, the larger forms and coarser sand settles, and the supernatant liquid can be poured off into another larger vessel. Again water is added to the first sediment, and, in turn, removed, and this is done as many as six or eight times, until we see that the coarse sediment is not contaminated by finer particles by the water it is shaken in remaining almost clear. The same process is carried out with the sediment in the second vessel, only permitting each charge of water to stand longer than in the first case, as the forms are now much smaller and require longer to settle. In this way we may get three or four densities of sediment, although I found that my specimen yielded but two which contained anything of interest of a calcareous nature. After, then, setting aside the two first sediments, I carefully acted upon what was left with hydrogen nitrate (nitric acid), and procured a small quantity of a sediment, consisting, for the most part, of nothing but the siliceous lorica of *Diatomaceæ*. They were very few, however; so, to procure all the remains of *Diatomaceæ* and other siliceous organisms present in the gathering, I took a quantity in the rough state, and, after breaking it down by potassa, acted on it with boiling hydrogen nitrate. Thus I found that I had good representatives of all the gathering contained. Some specimens, however, are not thoroughly cleaned by boiling, even for a considerable length of time in strong hydrogen nitrate. To such I add either hydrogen chloride alone or a few grains of finely pulverized potassium dichromate. In this way, and after thoroughly washing with pure water, I have been enabled to obtain extremely beautiful specimens of *Diatomaceæ*, *Radiolaria*, and other siliceous organisms in a good condition for studying them. This I am engaged upon at the present time, and intend, before long, to lay the results before the Lyceum.

* From the Proceedings of the Lyceum of Natural History, New York.

On Proposed Improvements for Common Roads.

By Professor S. D. TILLMAN, American Institute, New York.

[Read before the American Association for the Advancement of Science, at the Troy meeting, 1870.]

IF durability be the most essential quality in a good road, the ancient Romans excelled in the art of road making. Of the twelve famous highways leading into their capital, vestiges of which are still to be seen, the Appian way was the oldest. Originally its length was 142 miles; at a later period, it was extended to 380. It consisted of large blocks of smooth stone, accurately fitted together for the use of carriages, and a foot pavement on each side two feet wide. A part of the Tiburtine road, near Tivoli, still remains undisturbed, having been in use more than 2,000 years. One of the most remarkable roads of which we have any account, was that leading from Quito to Cuzco, built by the ancient Incas of Peru, 900 miles long and 75 feet wide. According to PRESCOTT, the historian, "it was conducted over pathless sierras covered with snow; galleries were cut for leagues through living rock; rivers were crossed by means of bridges suspended in the air; precipices were scaled by stairways hewn out of the natural bed; and ravines of hideous depth were filled up with solid masonry."

However much we may admire the massiveness and permanency of ancient roads, when estimated by the modern standard of utility, such structures are found not to meet the requirements of this practical age. Modern engineering has demonstrated that speed, certainty, and safety, are the three great requisites of intercommunication. An absolute and complete change in the means of travelling has been wrought by the introduction of the railway and the locomotive. One has given us a perfectly-smooth and solid pathway of easy grade, its great economy being in its reduction to such narrow width as to sustain only two wheels, which are kept securely thereon by means of flanges; the other has provided a moving power ever ready and reliable, untiring in its energies and matchless in its speed. The change thus wrought in our own country, where the railway system is far more extensive than in any other, was more marked, because the ordinary roads had not been much improved, and were in a condition similar to those of England a hundred years before. The once famous turnpike extending from Albany to Buffalo, over 100 feet in width, had been covered throughout its middle section, more than once, with broken stone, which, by the action of rain and frost, disappeared beneath the rich soil. Only forty years have elapsed since numerous stage coaches were running over this turnpike, making during summer and winter an average speed of eight or ten miles an hour, while in the spring and fall it did not equal that of the passenger boats on the Erie canal.

Previous to the introduction of the railway, numerous experiments were made for the purpose of improving the common highways, and more especially the pavements of cities and large towns. Of stone pavements, the cheapest and most objectionable is the cobble-stone; superior to this is the Belgian pavement, which consists of rough stone cubes, imbedded in sand. The most durable and costly, yet, in the end, cheapest stone pavement, consists of stone blocks, about three inches thick and twelve inches square, set on end, with their broadest faces in contact and resting on a bed of concrete, like that now on Broadway, in the city of New York. Professor MAHAN, in his essay on "Road Making," states that asphaltic pavements—consisting of bitumen and sand—and wooden pavements have been extensively used in Europe, but seem not to have answered the desired purpose. The most popular pavement in this country at present is made of wooden blocks, resting on a wooden foundation covered with bitumen, and separated from each other by means of a thin partition of bitumen and gravel. The ease with which the horse travels on this pavement, and the almost entire absence of noise, are strong points in its favor. The question as to its durability on much-travelled thoroughfares has not yet been definitely settled. Roads made on the plans of MACADAM and TELFORD are not used in the business streets of American cities, on account of the fine grit and dust resulting from the action of horse-shoes and wheel-tires. It is needless to say, none of the plans alluded to fulfil all the conditions of a perfect pavement, since none of them embrace the admirable peculiarity of the railway, in providing for the wheel a perfectly-smooth pathway. Obviously, the smooth, solid surface, on which great speed is attained by means of the locomotive, would on the common highway result in somewhat increased speed, with a great decrease in the power required to produce that speed; in other words, all loads could be transported more rapidly by employing not over one-third the number of horses now used to do the same work, and with far less wear and tear. To illustrate this point, let us take the most perfect pavement—that already alluded to on Broadway—where a pair of horses attached to an omnibus draws less than one-fourth the load drawn by a pair of horses attached to a street railway car. Each of the wheels of an omnibus, in passing from one stone, falls slightly, and raises as much by sudden contact with another; thus a series of concussions are made by each wheel, which jerk the horses, jolt the passengers, and jar the vehicle. The number of noisy concussions thus made by an omnibus, in passing over one mile on the Broadway pavement, is about 63,000, and in one day's travel, of thirty miles, is 1,890,000.

It may be asserted with truth that the concussions are not so great on wooden pavements, as is proved by the absence of noise. This result is owing to the fact that wood is more elastic than stone, and gives way slightly under pressure; yet, in this fact, lies the proof that a loaded wagon can be drawn with less effort over a good stone pavement than over one of wood; which will be apparent, if we reflect that the wheel, by its great pressure on the wood, is constantly sinking slightly below the general surface, and thus constantly forming an impediment before it which must be overcome. When the wood is wet the sinking of the wheel is perceptibly increased. According to the experiments made by Sir JOHN MACNEILL to determine the force of traction for one ton on level roads, it was found that on a gravel road the force is 147 lbs.; on a broken stone surface, laid on an old flint road, 65 lbs.; on a broken stone road, covering a rough stone pavement bottom, 46 lbs.; on a good stone pavement 33 lbs. To this it may be added, that the force on a railway is 8 lbs.; in other words, that one horse will draw on a railway more than four can on a good stone pavement. NICHOLAS WOOD, in his treatise on railways, estimates the force of traction for one ton on a smooth turnpike road at 73 lbs., and on railways at 8½ lbs.; that is to say, two horses will draw more on a railway than seventeen horses can on an English turnpike.

The important problem now presented, is to construct city pavements so as to embrace the essential features of the railway. Its successful solution depends on the following conditions:

1st. To form a solid and virtually smooth surface of an unyielding material, on which the carriage wheels may roll.

2d. To provide a foothold for horses in passing over such surface.

If the material used for this purpose is stone, in small blocks, we find by experience that, when laid with the utmost care, there is always a space left between these blocks, over which the wheel must roll, and in passing from a stone the wheel strikes the next with a blow proportionate to the load it sustains, the effect of which is to wear off the edge of the stone; and the wheel passing in an opposite direction wears off the opposite edge, so that the space between the stones is gradually widened, thereby increasing the force of the blow by the wheel; thus the stone in time becomes rounded on two sides, and in that form is hardly more efficient than cobble stone.

If the material employed were iron it might be cast in hollow blocks so as to be interlocked, and its face could be provided with a series of smooth raised surfaces, alternating with depressions or indentations; and the raised surfaces could be so arranged that the wheel would be constantly sustained on a true grade by rolling over one raised surface, which should touch the middle of the tire, or rolling over two raised surfaces which, either simultaneously or alternately, would give a bearing to the wheel tire near its sides. The transverse depressions thus formed allow the toe-cork, or fore part of a horse shoe, to sink below the raised or grade surface, and by means of such surfaces the horse would find a sufficient bearing against which to exert the leverage of his foot.

Cast iron blocks thus made might cover the whole surface of a street; but as the cost of such a pavement would be a serious obstacle to its general adoption and use, the more feasible plan is to provide an iron pathway or tramway for each wheel of the vehicle, and fill in the spaces between such iron pathways with either stone, wood, or asphaltic composition, thus providing a pathway for the horse. A pair of iron paths, each about one foot wide, and placed four feet and a third apart, would provide a tramway suitable for vehicles of various widths, embracing the pleasure carriage, cart, lumber-wagon and omnibus, and a pathway for a pair of horses between such tracks. The tramway could be made of hollow cast iron blocks, each about a foot long, with a projection on one end and a recess on the other, so that when brought together and interlocked, the pressure on the edge of one block would be transferred to the centre of the next. Such blocks could be laid directly on pure sand, or be filled in from beneath with wood and laid on a perfectly solid and smooth foundation. The tramway could also be constructed of longer wrought iron or cast iron plates, having longitudinal ribs or webs underneath to strengthen them; each resting securely, by means of spikes, on one half of the top of a wooden post set in the ground, and reaching below the action of frost. This plan would give a permanent pathway for the wheel, independent of that for the horse; and also would be unaffected by any changes which the surrounding earth might undergo by the action of water or frost. The face of such tramway could be composed alternating smooth elevations and depressions, of a series of narrow ribs running longitudinally, or of a smooth surface, having on it one or more lines of elevations and depressions, so arranged as to provide a foothold for horses, and, when placed on the edges of the tramway, to allow wheels to pass obliquely over it without sliding.

A single pair of iron wheel-paths of this description, placed in the middle of a street not much used, would accommodate all carriages which, in this case, would have to turn off from the track in passing each other. In a more busy street two pair of tramways would accommodate carriages going in opposite directions. In still more crowded streets four pair of tramways could be laid down—two for loaded teams moving slowly in opposite directions, and two for carriages moving more rapidly in opposite directions, and on great central thoroughfares, like Broadway in the city of New York, my plan is to lay down longitudinal iron paths, from six to nine inches in width, alternating with stone, wood or asphaltic footway for a single horse about two feet in width, so as to fill up the whole width of the street with alternate wheel-ways and horse-ways.

It need hardly be added that such tramways would make the steam carriage practicable.

Such, briefly stated, are the main features of the iron tramway system, which, if introduced on common roads, would add to the comforts of the pleasure carriage, save the wear of vehicles, make every horse four times more efficient, and, in fine, work a revolution as radical and beneficial as that which followed the introduction of the railway.

On the Duty of Cornish and Other Pumping-Engines for Draining Mines.

[From the Proceedings of the Joint Meetings of Engineers and Ship Builders at Glasgow.]

THE following interesting paper and comments we have extracted from the report of the above meetings to the *English Mining Journal:* Mr. J. B. SIMPSON commenced his paper on the above subject by setting forth that, as he had recently had an opportunity of erecting a Cornish engine in the Newcastle district, he was able to speak decidedly as to its merits and results. These being so satisfactory, and contrasting so favorably with the duty of the other engines usually employed in the Northumberland and Durham districts, it had been thought that to all those connected with mining, some details of the duty of the Cornish engine, as compared with those generally in use, would possess considerable interest, and would, at such a meeting as the present, lead to an interesting discussion on the most economical and best adapted machinery for draining mines, a subject which is every day becoming of more importance, greater depths having to be drained, demanding, of course, greater economy. The Cornish engine is single-acting, condensing and expansive, with an over-head tram, the pumps being attached to it at the opposite end from the cylinder. The strain is applied on the top side of the piston, and is entirely cut off when about one-third to one-half of the stroke is completed. It then expands, and thus finishes the remainder of the stroke, assisted by the vacuum underneath the piston. The pressure of the strain at the end of the stroke is generally at or below the atmospheric pressure. The cylinder is always made of sufficient size, so that the work may be accomplished by an average pressure or strain, and a vacuum of not more than 17 or 18 pounds per square inch. There are instances, of course, where this pressure is very much exceeded, but that interferes generally with the economical result. In the down-stroke of the engine the pump-rods in the pit are lifted, and these are generally arranged to be slightly in excess of the weight on the column of water, and should they be greater the application of a balance-beam remedies the defect. Plunger-sets are also employed, where possible, except when pumping out of a shaft filled with water, or at the bottom of the pit. This latter set should be as short as possible, and certainly not more than ten fathoms. In the up-stroke of the engine the weight of the rod lifts the piston, the steam escaping from the top of the under side through the equilibrium-valve; and when the stroke is completed the exhaust-valve, always of large dimensions, allows the steam rapidly to escape to the condenser, when a vacuum is formed to assist the down-stroke of the engine. The great differing features of the Cornish engine from other pumping-engines referred to are as follows:

1.—That it is generally worked at a high rate of expansion.

2.—That there is a steam-jacket attached to the cylinders; that the cylinder is covered with felt; and in addition to this, a covering of ashes or clay about one foot thick, and then a covering of brick-work, to prevent radiation; and that there is a drain-pipe from the jacket, to carry away the water from the condensed steam to the boilers.

3.—That the boilers and pipes are all arranged so that there is the least possible radiation of heat. The boilers being generally covered up with fine ashes or common clay, slow combustion is also aimed at. After describing in detail the Cornish engine which has recently been erected at Hebburn, the writer proceeded to give some of the experiments made thereon, in order to ascertain its duty. The annual cost of one hundred horse-power of effective duty, according to the results obtained, of say 3-6 pounds per horse-power, would amount to £83. Only one fireman is necessary each twelve hours, in addition to the engineman. The writer proceeded: Previous to this engine being erected we visited some of the large Cornish engines at the mines in Cornwall, and found that about three pounds of coal per horse-power per hour was about an average duty attained under unfavorable circumstances. Probably the most remarkable engine is the 100-inch engine at these same mines, but now removed, and an extract from the *Mining Journal* of February 25, 1860, may be interesting: "This engine made on an average 5¾ strokes per minute, and gave a duty of about 70 millions. The enormous work performed by it may be judged from the following particulars. Attached to it there are 14 lifts of pumps, of a total length of 381 fathoms. The quantity of water in these lifts raised by each stroke is 16,266 gallons, weighing 72 tons. The total weight of the mass put in motion at each stroke, including the rods and their counterbalance, amounts to the enormous total of 384 tons."

The importance of Cornish engines for water-works seems to be generaliy acknowledged. At the East London water-works alone they have no fewer than seven large Cornish engines, with cylinders varying from 72 inches to 100 inches in diameter. Much discussion has taken place in the engineering world on the merits of the Cornish engine as compared with the compound high and low pressure and rotative engines for water-works. The latter kind, as erected at the Lambeth and Chelsea water-works, is said to have attained the very high duty of 111,350,000 pounds, or equal to 1.99 pounds per horse-power per hour of effective, or 1.61 pounds of indicated duty. We have not yet heard of its application to mines. The uniform motion which it would give to shear-rods in the pit would, as compared with the rapid upstroke of the Cornish engine, be in its favor. After describing the principle of the double beam-engine, the Watt engine, the single beam-engine, and the horizontal rotative pumping-engine, Barclay's patent overhanging beam-engine, the direct-acting engine, and the rotative beam-engine, Mr. SIMPSON went on to say—In ascertaining the duty of the foregoing engines we have calculated the quantity of water delivered each stroke, both in the bucket and the plunger. We have not been able to make any experiments as to the exact quantities delivered by buckets-lifts, but we have made trials with three sizes of plungers, as follows:

Diameter of plunge. Inches		Calculated quantity per stroke—Gallons	Measured quantity.	Difference.
18¼	80 in.	75·4	73·5	1·6
20	88 in.	99·7	96·5	3·2
25	99 in.	176·0	172·0	4·0
		351·1	342·0	9·1

These results show an average loss of 2.52 per cent. There is a great variation in the duty of the engines under consideration, and whilst allowance must be made in some cases for old machinery and defective arrangements, yet there is still a great balance in favor of the Cornish engine. It is quite possible that some engines of the types described might show similar results if worked expansively, and fitted up with a steam-jacket, and with valves of proper dimensions, and supplied with steam from proper boilers, and with properly balanced pumping arrangements, and with many little details attended to which are often overlooked; but it remains to be seen whether such engines under these conditions would be as cheap as the Cornish engine. With respect to the coal used in these experiments, although we have not made any special experiments to ascertain the evaporative power in all the cases, yet they have all been conducted with small coal passed through ½ inch screen, of the same estimated evaporative quality. When space is not so much an object, it is our opinion that if freedom from smoke and economy of fuel are to be obtained the ordinary Cornish boiler will produce these results quite as cheaply and as effectively as any form yet introduced. but with these conditions—that it be slowly driven, and that perfect combustion be arrived at. Many people believe that the harder you fire a boiler so much the better; at all events, this is too often the practice, and it is, to a great extent, the cause of such bad duty in our engines. There is great economy in having abundance of boiler power. We recently made an experiment with two Cornish boilers, and found that during twenty-four hours an evaporative power of 7.7 horses was realized, and that with two egg-ended cylindrical boilers, placed alongside and going into the same chimney, an evaporative power of 6·7 horses was obtained, thus showing a saving in favor of the former of thirteen per cent. Taking the engines we have mentioned into consideration, we find a total aggregate effective power of 1030 horse-power applied, realizing on the average a duty of 14 pounds per horse-power per hour. This we believe to be the average duty of the district. Where a duty of 4 pounds was obtained the saving of these engines alone would represent 40,000 tons of coal per annum, which, at 3s. per ton, would equal £600. We may safely assume the total horse-power of engines used for pumping water in the Newcastle district at about 10,000, and upon the above basis of saving we have a very momentous sum as the result. In many places coal may not be worth so much as 3s. per ton at the pit's mouth, but in the majority of cases it will very much exceed this. We are too much inclined to think that coal at the colliery is of little or no value, and that the extra consumption of 10 or 12 pounds per horse-power per hour is not worth consideration. It must not, however, be forgotten that the fuel is not the only pecuniary point of the question, for additional consumption of coal means additional boilers, additional repairs, and additional wear and tear, to say nothing of additional manual labor: and these, in the aggregate, are very serious items of cost. There is no doubt that more attention is being paid to this subject than formerly, and we venture to predict that the time is not far distant when pumping and all other colliery engines will be erected with more regard to annual economy, and that the effective duty of 2 or 3 pounds per horse-power per hour will be considered quite as important in them as it is now in the London water-works and in ocean steamships.

Mr. STEVENSON (Airdrie) was inclined to think that the Cornish-men gave too much credit to the Cornish engine, without making allowance for the fact of covering the engine, and so on, There was no special value in the Cornish engine any more than in several other kinds of engine he could mention. It was quite possible that in conducting their experiments they had overlooked that steam was applied; they assumed that the water was a certain amount; they took such and such a temperature, and so many feet of pressure; and then they assume that the engine was doing so much work, when it was doing nothing of the kind.

Mr. SIMPSON said he had another diagram to show the cost per indicated horse-power per hour per ton, and the effective duty. The engine which Mr. SIMPSON referred to was 44, or it was realizing 84 per cent. of effective duty; but still, taking that into consideration, £977 was the cost per annum of coal for 100 horse-power of effective duty, and indicated duty brought it down to £842. The effective duty of the Cornish engine, according to the experiments which he had made, was 81 per cent., and gave an indicated duty of 230 pounds, as compared with the other engines, which gave 79, 8I, 83, and even as far as 89 per cent. He took, in all cases, the calculated quantity. Mr. STEVENSON complained he had taken the Cornish engine. He had frequently studied the question, and he gave them the results of the different engines. He had given the quantity of water pumped by the plungers, at a cost of only 25 per cent., and he believed that Mr. STEVENSON, in a former paper, had stated the loss by buckets at something like 10 or 20 per cent., so that, as far as the plungers were concerned, he thought there was no better form of pumping water. There was no better way of getting a quantity of water for each stroke.

Mr. STEVENSON (Airdrie) said that in the arrangement of the Cornish boiler there is nothing peculiar. Its alleged superiority was owing to the extreme care taken in firing. He thought no proper engine could give proper maximum results of economy unless they got a greater speed in the piston than could be obtained either in the Cornish engine or by any pumping engine with direct action through the pumps. He thought the slow speed of the Cornish engine would conduce unfavorably to such results. The slow speed necessitated a larger cylinder, and a much larger working power, and, consequently, a greater amount of friction. Then there was the reversing of the back bands, which was also objectionable. His idea was that the best kind of engine was one with an up and down stroke, not one doing work with one-half stroke, and then presently undoing it with the other half. The horizontal engine was the best, if they could get greater speed in the piston, and that had recently been obtained by making one end of the bell-crank double that of the other.

Mr. HARVEY (Cobham) said he had not yet given up the idea of being able to obtain the essence of coal for propelling vessels at sea, which could be stored in very small bulk, and thus save a great deal of stowage room.

Mr. W BOYD remarked that the advantage of the Cornish engine over the old system lay in the increased pressure of steam employed, and the increased degree of expansion that could thereby be obtained. Mr. SIMPSON spoke of expanding the steam, so as to consume two pounds of coal per hour. He also spoke of BARCLAY'S compound engine having a consumption of 1-6 pound per indicating horse-power.

Mr. SIMPSON—A water-works engine.

Mr. W. BOYD remarked that the increase of economy in the Cornish engine was due entirely to the higher pressure of steam employed in the boilers, by having a cylinder in the proportion of 2 to 1, and cutting off by half a stroke the small cylinders, they got immediately a degree of expansion of 8 to 1, and therein lay the secret of the economy in the working of all pumping and other engines. He would not go into the general question, which was well known to engineers. The quantity of heat put into the steam at the higher pressure, was less in proportion, in order to get an equivalent degree of pressure than at the lower. Therefore, if they could expand it into a condensing engine, as in the compound engine, that appeared to him to be the most economical way that could be adopted.

Mr. JEREMIAH HEAD said he felt tempted to ask for two or three minutes, in order that he might call attention to the absolute necessity of bearing constantly in mind the distinction between the boiler which generated the steam and the engine which applied it. It was quite possible to have a very good boiler working in conjunction with a very bad engine, or *vice versa*. The absurd want of economy which his friend, Mr. SIMPSON, had shown to exist among the pumping engines at the North of England coal pits, was not so much due to any particular form of boiler or engine, as to the lack of maintenance in a reasonable state of efficiency. An engine of almost any kind, with little or no expansion, and supplied by an ordinary plain cylindrical boiler, would, if in good order, easily work with four to five pounds of coal per indicated horse-power per hour. Any excess above that was owing to leaky pistons or slides, exposed cylinder or boiler surface, excess of clearance in the cylinder, or exhausting into the atmosphere, with a low initial pressure of steam. Such defects as these were very discreditable to steam users. But we must be careful, before blaming any person for not at once choosing an engine and boiler on the Cornish principle, in preference to those in common use at collieries. It must not be forgotten that the advantages of high expansion can only be obtained by employing a larger and more expensive engine to do the same work. The same remark applied to the Cornish boiler. Putting aside the question of fittings and brick-work, a fifty-horse boiler—that is, one capable of evaporating fifty cubic feet per hour—on the plain cylindrical type, could be bought for £100. A Cornish boiler of equal power, and of good quality, would cost nearly three times that amount. He had tried many experiments upon the relative economy of the two classes, and he found that the economy of the more expensive boiler only amounted to an average of 10 per cent. Was it to be wondered, then, that coal-owners hesitated before expending a three-fold amount, in order to obtain a saving of slack coal at the pit's mouth equal to 10 per cent.?

Mr. SIMPSON remarked that if as much attention were paid to other engines as to the Cornish, they would be as economically worked as it was.

This terminated the proceedings of the first day, and after passing a vote of thanks to Mr. SIMPSON, for his interesting paper, the meeting adjourned.

[FROM OUR SPECIAL CORRESPONDENT.]

Nevada Silver Mines.

I.—WHITE PINE.

TO THE EDITOR—SIR: According to promise, I proceed to send you some of my impressions in regard to silver-mining districts I have lately visited in the great silver and sage-brush State, Nevada. I cannot send you descriptions of all the mines I have seen, nor of all the districts; but I shall pick out such as are evidently of great importance already, or promise to become so.

Leaving the Central Pacific railroad at Elko, a town which owes its existence to the road, and which is now the shipping point for White Pine and Elko counties, I took the stage to Hamilton, one hundred and twenty miles distant by the old route, and possibly one hundred and thirty miles *via* Eureka, the way the stage now runs. The stage leaves Elko at five P. M., and pursuing a course almost due south, reaches Eureka early next morning. An additional six hours' ride east brings you to the pleasant town of Hamilton, the county seat and largest business place of White Pine county. I had already heard, on the road, that White Pine now was a "dead camp." Remembering the exceedingly prosperous condition of that

locality a year ago, the unparalleled excitement produced by the discovery of its rich silver deposits, and the large returns made in a very short time, I must confess that I was astonished to find as rapid a decline as the ascent had been sudden. The town of Hamilton is dull, immeasurably so, and the streets are filled all day with loungers who cannot dispose of their interests, and are therefore forced to stay a while longer. It was of course of the utmost interest to me to trace the causes for all this; and I must confess that, on investigation, I cannot find cause for alarm to such an extent as has taken possession of all interested. It is the old story in American mining: first, violent, extravagant and all-absorbing excitement, unwarranted by real facts; and then utter despondency, after the rich ores have been taken out and the economical working of the larger bodies of low-grade ores must be faced. Such ores still exist in enormous quantities, and there is therefore really no just cause for the prevailing discouragement. But it is true, the extravagance of former expectations must be justly toned down to a point, where mining is considered as a business which must be conducted as prudently and economically as any other, in order to insure financial success. I have visited Treasure Hill, in company with Mr. J. E. CLAYTON, who has probably, from his long experience, the most extended knowledge of the geological features of the district. By his courtesy in pointing out certain features, a speedy comprehension of the rather intricate structure of the region, and especially Treasure Hill, was very much facilitated. There are no ore-bearing veins on Treasure Hill, all assertions to the contrary notwithstanding; but it is true that the limestone strata, themselves much tilted and bent, are traversed in numerous directions by larger and smaller veins of calcspar, which are locally termed "spar-dykes," and carry no ore. The main anticlinal of the strata runs almost due north and south on top of the mountain, and along the east side of Treasure Hill a fault of at least three hundred feet in height can be distinctly traced. The fissure along this fault is now filled with calcspar, and smaller ores, running obliquely and at right-angles into it, contain the same material. As I mentioned above, these spar-veins carry no ore, but on one or both sides of them the limestone is invariably diversified to a great extent, and here occur impregnations and pockets of silver ores. In the richer pockets the ore can of course be recognized, but in ores which carry from thirty to forty dollars silver per ton, there is generally no trace of silver visible. The rock looks like a dark, quartzy limestone, and for the miners the flinty matter is, in fact, the only guide by which to select ore from the country rock. The ore impregnations follow these spar-veins vertically downward, and spread also horizontally between the layers of limestone. In mines of this kind a large amount of barren rock is, of course, invariably transported and crushed at the mills, together with the real ore, simply because the mineral contained in the rock is only very rarely visible. The South Aurora and Hidden Treasure were the only mines of note being worked at the time of my visit. The Eberhardt, once so famous for its rich ore-chamber and stupendous yield, was shut down, as the English company, which bought of the original owners, had not got ready to work their costly purchase. I could not visit the mine, but am reliably informed that, although the old rich deposit is completely worked out, a vast amount of low-grade ores remains to be worked. I hope, for the sake of the company, and also the reputation of the district, that these ores may not prove to be too low-grade to permit profitable working at present. The South Aurora has rich ores and a great quantity of them in sight, and is working a large force of miners.

It has been worked like an open quarry, and the ore is taken from it through tunnels penetrating the barren limestone west of the deposit. The four openings on this mine are very wide, and have reached over one hundred feet in depth. The Hidden Treasure does not look very promising at present, although the company is still energetically at work. I must, however, confess that in this mine less than any other, a *system* of mining could be recognized. There are several companies working on a small scale on the west side of Treasure Hill, on Chloride or Bromide Flats, and the so-called "chloriders" are scraping up small quantities of rich rock in many places. But, with the exception of the above-mentioned localities, Treasure Hill looks deserted, and thousands of little discovery-holes and dumps are the only marks left of the former excitement and bustle. Treasure City itself is almost entirely deserted; a few people remain who cannot get away, but there is evidently no business going on. Of the neighboring mills and furnaces only a few are running, and those not very regularly.

I have of course also visited the Base Metal Range. The ore deposits here occur entirely differently from those on Treasure Hill. They are all lying between and parallel with the limestone strata, and vary exceedingly in length and width. It is characteristic that they invariably occur in certain zones in the limestone, along and near to thick strata of quartzite, which alternate with limestone and slates. The deposits carry mostly an iron cap, which is from two to three feet deep. Below it occur carbonates of lead mixed with arsenate of iron, and frequently lumps of undecomposed galena are found in the middle of large bodies of cerussite. The number of claims taken up is enormous, but few are actually worked at present. The principal reason is, that the percentage of silver contained in these ores is actually too small to pay for working at present. The average contents of silver is only from twelve to thirty dollars per ton in different mines, and the cost of coal being from twenty-five to thirty cents per bushel, and thirty bushels being used to smelt a ton of ore, while labor in the mines is four dollars and in the furnaces five dollars per day, you must see that such ores cannot pay for treatment at a locality one hundred and twenty miles from railroad communication. A reduction of wages and freight, in case the long-talked of railroad from Elko to White Pine should be built, will of course remove the obstacles now in the way of profitable working. Of the quantity of smelting ores in the Base Metal Range, there is no doubt they occur everywhere in large deposits, and will eventually be the surest basis for extensive mining industry. About six miles to the north-west of Hamilton occurs a mineral-bearing zone on White Pine Mountain, which seems to hold out better inducements for working at the present time. Ores from this locality are now in New York for assay, and if they should prove to be as rich as their appearance leads me to expect, this locality will rival the now famous region near Eureka, of which it is an almost exact geological and mineralogical counterpart. Facilities for smelting are here better, and especially the item of coal may be reduced to almost half the Hamilton and Shermantown prices.

In my next I shall give you a description of the mines and furnaces in Eureka District, Lander county, a camp which has lately assumed the highest importance, and which is the more remarkable, as it has not sprung into existence by a sudden excitement, but has reached its present proportions by steady growth for four or five years.

MINING SUMMARY.

Nevada.

OCCIDENTAL REDUCTION WORKS.

The Gold Hill *News* has the following account of the new mill just completed for the Occidental Mining Company:

"The mill is erected on the northerly bank of the ravine, some three hundred yards below the mouth of the lower tunnel of the mine, thus giving the most convenient possible facility for dumping the ore directly at the batteries, a railroad and a horse-car of four tons capacity being the principal method of transportation. Through a trap in the bottom of the car the ore is discharged into a receiving dump, where the coarsest lumps, not passing through a large screen, placed there for the purpose, are put through a heavy rock breaker of the Brodie pattern, and together with the balance of the ore, passes through short shutes directly into the mill building, close to the batteries, convenient for shoveling into the mortars.

"Being built upon a side-hill, this mill is most conveniently arranged for the cheap and convenient handling of the ore, so that it passes from one stage of treatment to the other with the utmost facility, being merely sent farther down hill each time till it is done with. This is a twenty-stamp mill, capable of reducing from sixty to seventy tons of Occidental ore per day. The stamps weigh 750 pounds each, and the mortars are very firmly bedded on heavy timbers standing on end, the lower ends resting upon the solid bedrock of the hill itself. Indeed, everything about the mill is of the most substantial style and construction. The pulp from the batteries passes into an extensive series of settling tanks, whence it is shoveled into the grinding pans, of which there are six. They are of the famous Stephenson pattern, considered the most effective in use, and being of the largest size, they are capable of working two tons each at a charge, the time for working this charge being four hours. Thence the pulp passes through the settlers, of which there are three, nine feet in diameter each, and a huge cistern agitator at the outside of the building. The pulp—now 'tailings'—passes thence along the hillside through a long series of blanket sluices, arranged for catching the heavy sulphurets, until it empties itself into the bed of the ravine. Even there it has to pass through a series of dams constructed for the purpose of arresting what little value is supposed to be left, although one would naturally suppose, after passing through such an apparently effective milling process, every particle of precious metal would be extracted from the ore even before it got to the sluices. The water supply for the boilers, batteries, and other purposes usual about such a mill, is very abundant, there being an excellent unfailing stream from the lower tunnel of the mine. There are, we should judge, fully seven or eight inches of it, miners' measurement—therefore sufficient for a mill of considerably greater capacity.

"The engine which drives the batteries, pans, and all the other machinery of the mill is a very neat, smooth-working one, capable of being worked up to 100-horse power, having 16-inch cylinders and three feet stroke. It is from the Vulcan Iron Works, San Francisco. There are four boilers, each 16 feet in length by 54 inches in diameter, and each containing 48 three-inch tubes. They were manufactured at the Nevada Boiler Works, Silver City. Only three are needed at a time, therefore the mill never has to stop for repairs or cleaning of the boilers. The amount of firewood daily required is about seven cords. Everything about the mill is very conveniently arranged, and we noticed with approval that all the pan gearing and similar driving machinery is beneath the floor, out of the way. The mill building, comprising boiler-room, wood-house and all, is of commodious size, well built, and painted with brown, fire-proof paint. REESE & BROWNING, of the Union Foundry, on the Divide, were the building contractors of the mill, their bid being $14,500. Everything about the mill is well constructed, and creditable to all having anything to do with it. Mr. WILLIAM WESTON is President of the Company. Mr. SIMON SCHLEWECK attends to the milling department, and Mr. WILLIAM SKYRME is foreman of the mine."

TERRIBLE AND FATAL ACCIDENT AT THE HALE & NORCROSS MINE.

On the evening of the 24th of August THOMAS STANTON and DAVID RYAN, working at the bottom of the HALE & NORCROSS shaft, were instantly killed by a cage and car falling upon them. The Gold Hill *News* has the following account of the accident: "They, together with JOHN COCHRAN and MATT. SULLIVAN, were engaged in sinking the shaft deeper. An empty car was being lowered on the cage, when near the top of the shaft, the heavy bolt connecting the brake lever with the friction band around the brake wheel, broke square off. The consequence was that cage and car, weighing nearly a ton, immediately descended with frightful velocity to the bottom of the shaft, which is 1,200 feet deep, the heavy wire cable following it just as fast as the swiftly revolving reel would allow. Indeed the engineers ran out of the way, expecting every instant to see the reel and brake wheel fly into fragments. They say a perfect stream of sparks flew from the friction wheel and brake strap nearly to the ceiling. Fortunately, however, the flying end of the cable, as it left the reel and dashed down the shaft, did very little damage. The cage and car, in their descent, passed through two strong platforms of heavy timbers a foot thick, one of them about 45 feet from the bottom, and the other only 10 or 12 feet above the heads of the men, passing through both as though shot from a cannon. STANTON and RYAN were standing erect, or nearly so, therefore they were both crushed down to instant death, the bodies of both being considerably mutilated and broken. COCHRAN was bent over, working, and was knocked prostrate, with his legs under the cage, but the other unfortunates receiving the full force of the falling weight saved him, and he escaped with comparatively light injuries. We were present at noon to-day while Drs. WEBBER and HALL were making a surgical examination of him at his cabin. They found the head of the right thigh bone fractured at the hip joint. A pick, or something of the sort, had also evidently been driven several inches into the fleshy part of the thigh at the under side, but this wound was not considered serious. SULLIVAN, the fourth man, was working beneath another compartment of the shaft, a few feet distant, therefore was lucky enough to escape entirely unhurt. The cable fell, coiled among the debris of the broken platforms, upon the car and cage, therefore it was quite a job to extricate the dead bodies. Both were eventually removed to KEYES' and another undertaking establishment on C street. Both of the men killed were natives of Ireland, and both were married men. THOMAS STANTON leaves a wife and two children at Virginia City, and DAVID RYAN leaves a wife in Gold Hill, but no children. STANTON was a member of the Virginia Miners' Union, and RYAN a member of the Gold Hill Miners' Union. Both were young men, RYAN being about 28 or 30, and STANTON about 33 years. Coroner SYMONDS will hold an inquest upon the bodies this evening at six o'clock, and we understand that their funerals will take place to-morrow. We visited the scene of the accident this morning in order to ascertain as nearly as possible the true cause of it. The bolt broken was not defective. It was two inches in diameter and showed no flaw, but simply a square break of good solid iron. This accident of course develops the now evident fact that a two-inch iron bolt was not strong enough, yet no one could hardly be blamed for mismanagement; it was a purely accidental circumstance, and one of those unforeseen calamities continually occurring in our mines. Two strong brakes instead of one might be used, and thus the recurrence of a similar accident prevented in the future. Engineering invention certainly can contrive some sort of safeguard to apply in such emergencies. The cage was of the safety pattern, but owing to the tension kept upon the cable the safety clutches were not free to act, as they would have infallibly and effectually done in case of the cable breaking. We append this last remark by reason of having heard several persons state this was not a safety cage. It was, and a very good one at that—so strong that it was but little injured by its fall.

Idaho.

THE ALTURAS COUNTY MINES.

A correspondent of the *Statesman*, writing from Boise City, Aug. 16, furnishes the following interesting facts concerning Alturas county, from recent personal observation. He says: "But little has appeared in the papers this year concerning Alturas county, and to many no doubt its fame as a mineral region, rich beyond comparison, was sinking into insignificance, if not oblivion. But during all this time it has been like the slumbering volcano, ready at any moment to emit volumes of its hidden treasure in gold and silver by a judicious expenditure of money, and proper and economical management by competent mining superintendents. It is now a well established fact that quartz mining requires a large amount of capital to open up and thoroughly develop its richness and extent, and is often attended with many tedious and sometimes serious delays which are not only annoying and perplexing to the superintendent in charge, and perhaps to some extent to the community in general, but far more so to the shareholders, who in most instances reside at a remote distance, say in the larger cities of our Union, like New York, Boston, Philadelphia, Chicago and St. Louis, and know nothing about mining, but base their calculation entirely upon representations made to them at the time of the organization of their companies, and who never for a moment anticipate any reverses in business, but imagine that any change must be for the better. But after one or more disappointments they become disheartened, and without listening to the 'voice of reason,' and just when a little more money, labor and time are needed to complete the much coveted and long anticipated prize, they refuse further aid, and all becomes chaos, confusion and disappointment. All these things have been of so frequent occurrence in Alturas county that they are expected to happen as a matter of course.

"No person who has ever visited this county, I care not who he is, or how much prejudice he may be filled with, but what will say there is more and richer quartz than he ever saw in any other country in his life. Why have not these mines paid, then? That is the question. I answer: The quartz when crushed has paid, but the expenses have eaten up and absorbed what should have gone to shareholders in dividends. Labor has been and still is too high. No mine in the world will, for any great length of time, justify the payment of any such wages as $5, $6 and $8 a day in gold coin for hired help. The wages being reduced to one-half these amounts, and board included, and my word for it, Mr. Editor, within eighteen months from this time not less than twenty mills would be in successful operation, each employing from 50 to 200 hands, who would get their money every Saturday night. One of the most thoroughgoing and competent mining superintendents ever in Alturas county told the writer some few months ago that had he not paid over $3 to $3 75 per day for labor, his mill would now be running, and he could have sent his company at least $30,000 in dividends.

"ROCKY BAR

has been seemingly dull this summer, owing to the stampede to Snake river diggings; yet more money has been taken out this season for the number of men engaged than ever before in the history of the camp. The Idaho mine alone has turned out over $20,000 this summer. Twenty-two tons of ore from this mine, recently crushed by T. FORD and A. G. KRAMER, paid over $200 to the ton. Captain SETTLE, T. L. JOHNSTON and I. C. DERRICK, who are now the sole owners of this famous mine, are also at work crushing ore equally as good as that above mentioned, while JACKSON & BAILEY are just completing a run of some thirty tons of the same, that will yield equally well. Instead of 'petering out,' this mine never looked so well or yielded better or richer ore since its discovery.

"RED WARRIOR.

is rather quiet now, though it is expected the Casco company of which Hon. JOHN MCNALLY is superintendent, will resume work again this fall.

"BONAPARTE HILL,

situated some seven miles in a south-easterly direction from Rocky Bar, is the most lively camp in the country. The Bonaparte Gold and Silver Mining Company, of which Mr. L. LINCOLN is superintendent, have been hard at work all summer, employing seven men at wages ranging from $60 to $75 per month, currency at par, and now have out and ready for crushing some 125 to 150 tons of very fine looking ore that will pay from $75 to $150 per ton. They have a shaft down on the main ledge some sixty feet. A tunnel is also being run that will tap the ledge at the bottom of the shaft, and it is now within fifteen or twenty feet of the same. The tunnel is one of the finest in the territory, and will be about one hundred feet in

length. This company are also running another tunnel on the side-drift which is now in about seventy feet and on the main lead, which is two and one-half feet in thickness of solid quartz and of an excellent quality. This company will commence crushing in the early part of September, with one of the nicest mills ever brought into Idaho Territory. To their credit be it said, this company contracts no debts, but have money and pay their way as they go. They do not *promise* big wages and big things, but get every thing done as cheap as possible and pay the cash down for it.

"NEW YORK AND OHIO GOLD AND SILVER MINING COMPANY,

CHARLES R. FOSDICK, of Cincinnati, superintendent and agent, is situated on Bonaparte Hill, and is one and the same mine, beyond a doubt, as that now worked by Mr. LINCOLN. This Company own 3,400 feet of the Bonaparte, and have out about 200 tons of ore equally rich as that above mentioned, and of a similar character and quality, which will doubtless pay not less than $100 per ton. They employ seventeen men, at wages for miners averaging from $2 50 to $3 per day, currency, and found, and $6 per day for mechanics. JAMES MCLACHLIN, well known all over Idaho, and I might almost say the Pacific coast, is superintendent of the mine. Messrs. LINCOLN and FOSDICK both informed the writer that they had the best lot of workmen they ever saw. They get along nicely, and have few or no contentions. These men have established certain rules, which to some extent are quite new in this country, and will no doubt meet with universal approval. They do no work whatever of any kind on Sunday, neither do they pay out any money on that day, but all can get their cash any time during the week. This Company have a tunnel 200 feet on their lead, giving them a 'stope' of say eighty feet. The ledge averages about eighteen to twenty inches in width. This tunnel runs in a westerly direction from the Discovery. They have also commenced a new tunnel running east, and have progressed about sixty feet on the same. They have their own saw-mill, consequently are never at a loss for 'lagging' or timber for the tunnel. The tunnels are well timbered, and all accidents scrupulously and well-guarded against.

"THE MACHINERY

is all on the ground, and will be in readiness for crushing the early part of next month, and for simplicity, cheapness, and durability, will surpass anything ever before introduced into this Territory, and will no doubt create a revolution in quartz-mining in Idaho. CHARLES R. FOSDICK will be the agent for the sale of the same. The mill-building is fast approaching an early completion, and reflects great credit upon its architects and builders, J. C. ALLERTON and W. H. ROBERTSON, and in size is 32x34.

"ATLANTA AND YUBA.

Of this camp I will speak more fully in a future correspondence. Mr. L. MATTINGLY has recently returned from England, accompanied by Dr. BISHOP, and I assure you they received a most cordial and hearty welcome, and deservedly so for the interest they have taken to *honestly* and fairly represent our mineral resources to foreign capitalists. The Atlanta mine is no doubt sold in London, and I am happy to say our English friends have got a good paying mine, and the richest in the world, and no 'wild cat.'

"THE SOUTH BOIS WAGON ROAD,

now owned by B. J. NICHOLS, is nearly completed, and will be one of the best roads in the Territory, and accessible at all seasons of the year, when the snow will permit travel.

Colorado.

GRAND ISLAND DISTRICT.

From the Central City *Herald* of Aug. 9, we clip the following extracts relative the Grand Island mines, of which we published a long account last week:—"Grand Island District is situated in Boulder county, eighteen or twenty miles north of Central, and about the same distance west of Boulder city. The discoveries have all been made among the mountains within the space of two or three miles square, lying to the north and west of the Middle Boulder, and between that stream and the 'Range' proper. The district is almost entirely covered with a heavy growth of pine. The road from Black Hawk to Grand Island is in pretty fair condition for the greater part of the route, which lies over the 'Dory' or four-mile hill,' through South Boulder to Middle Boulder creek. The latter stream is but two miles below, and this side of the Cariboo and other mines.

"The Cariboo Mine is the most famous of the leads of this locality, and the most profitable worked there, if not in Colorado. It is situated on Conger mountain, about two miles from Boulder Creek, above which it is elevated some 1,100 feet. The lead is situated on the north side of the mountain, and pitches out for the first 30 feet, where the crevice splits, one portion continuing to incline outward while the other takes a perpendicular direction, both coming together at some distance below.

"The discovery shaft of the Cariboo has been sunk to the depth of 75 feet. At this depth bad air gave some trouble, but air pipes have since obviated this difficulty. However, work at the bottom of the shaft is discontinued for a time, owing to the immense quantity of rich ore nearer the surface. A second shaft is being sunk fifty feet west, and a trench has been dug to the depth of 12 feet on the surface between the two shafts, following the course of the crevice, which is from four to six feet in width. A drift is also being driven from the old to connect with the new shaft. The drift is 50 feet below surface, has a pay vein of two feet of ore of an average richness greater than has yet been taken from the lead. The latter crevice is one of the two splits in the main crevice spoken of above. The ore from this drift is sold to HILL at from $202 to $210 per ton. The poorest ore from other parts of the mine has yielded from $75 to upward of $100 per ton. Fourteen hundred pounds of ore were recently sent to Newark, N. J., for treatment, and gave a return of $252 39, being at the rate of $357 65 per ton. This lot was selected, but was sent just as it came from a rich place in the vein. Eighteen men are employed in night and day shifts in the mine, receiving $3 25 per day. Four teams are engaged to carry ore to Hill's works, Black Hawk, taking over 12 tons per week, at a cost of $12 per ton. The quantity mined and shipped will be greater as soon as the work of timbering the mine is completed, and the force of miners will also be increased. Each team carries an average load of two tons. There are no signs of any diminution of the supply of ore; and as it is easily mined at a remarkably small expense, the prospects of the owners are brilliant in the extreme. The receipts from the mines are far in excess of the expenditures, enabling all bills to be paid promptly.

"The Columbia lode, situated very near the Cariboo, owned and worked by GEO. SPENCER, MORKHART and FAIRBURN, promises to be a rich investment to the fortunate discoverers. It has been sunk to a depth of 12 feet, and shows a well-defined crevice of three feet in width, of very fine looking ore. A load of this ore was last week taken to Hill's works, and gave a yield of 100 ounces to the ton.

"The Treasure, owned by the SMAIL brothers, JAMES KEAN and Mr. GULICK, gives prospect of having been rightly named. It has been sunk to the depth of 15 feet, has a crevice of from four to five feet in width, with six to eight inches of rich ore. Three thousand pounds recently sent to Hill's works gave a yield for the first class of 190 ounces, and 90 for the second class, being at the rate of 280 to the ton.

"Many other lodes have been discovered near by. Some are said to be valuable and more of them the reverse. Prospecting continues lively, extending down to the Boulder. Successful prospecting is rendered quite difficult by reason of the numerous slides which have taken place."

ON DIT ABOUT MINES AND METALS.

The Marquis of Hasting's Collieries.—The executors of the late Marquis of Hastings have sold the collieries belonging to his lordship's estate to his eldest sister, the Countess of Loudoun. The amount paid for them was about £170,000. The collieries lying on the borders of Leicestershire and Derbyshire, between Burton-on Trent and Ashby-de-la-Zouch, are of considerable extent.

Nitro-Glycerine Test.—One hundred and six pounds of nitro-glycerine were recently exploded in one blast at the New York mine, Lake Superior, throwing down about 1,300 tons of ore. A blast at the same time containing fifteen kegs of powder threw down about the same amount of ore. The last blast was, however, in better ground than the first, and can hardly be considered a fair test as to the relative merits of the two explosives. Another test is to be made.

New Mines on Snake River.—There is a report of new mines on Snake river, at the foot of the Big cañyon, a few miles above the Owyhee ferry. The Idaho *Statesman*, Aug. 16, says that several parties started for that place to prospect, and more are going. The prospect is said to be good. "There is no longer any doubt but paying mines will be found throughout the whole length of Snake river from Lembi to Lewiston. Its sands are literally sands of gold, and its tributaries are but the tailraces of rich placers."

Traction Engines.—The invention of Messrs. MERRIMAN and REDMOND, of Rochester, Eng., consists in producing the traction by means of a set of flukes or anchors, which are made to protrude from the rim of the driving-wheel and enter the ground as the wheel advances upon it, and again to withdraw into the wheel after the traction is accomplished, both the protrusion and the withdrawal being made in a somewhat perpendicular direction, to avoid tearing up the ground. The wheel may be fitted with any number of such anchors, and the machine may have one or more such driving-wheels.

Belgian Mechanical Industry.—The rolling-mills of the Marcinelle and Couillet Company produced in 1869 40,303 tons of iron of various descriptions. The blast-furnaces of the same Company made in the same year 64,476 tons of pig. The construction-workshops produced steam engines, various pieces of machinery, forgings, etc., to the aggregate value of £65,894. The turn-over of the year was £480,083, and after making the redemptions of capital prescribed by the statues, the net profits of the year amounted to £21,846. The Company continued the working of the Marcinelle and Gouffre collieries last year, and the extraction of coal effected from those workings attained a somewhat considerable total.

Gold Export of New Zealand.—The total export of gold from New Zealand up to the 31st of March last was 5,136,221 ounces, valued at £19,973,588. The export of gold during the year 1869-59 was 615,809 ounces, valued at £2,385,971; and for the three-quarters ending March 31st, 1870, it was 456,732 ounces, worth £1,780,000. Of this total, Auckland exported 90,900 ounces in 1868-69, and 91,308 ounces in the broken period of 1869-70. It is thus seen that the Auckland gold field is progressive in its yield. It is purely quartz mining.

The Cedar Creek mines, Montana, are yielding on an average $6 per day, the best mines paying $40 per day to the man. About 1,200 men are now in the camp. Pilgrim Bar, about fourteen miles from Deer Lodge, is the best camp in Montana. Some of the claims are paying $6,700 per week.

Something New.—JOHN R. CASE, of the Champion Furnace, has invented a machine for economising waste charcoal, which we believe will save thousands of dollars to our smelting companies. The invention consists merely in a machine for pressing the waste coal and coal dust, after it has first been saturated with tar from the kilns, into blocks about the size of an ordinary brick. We saw some of these bricks while at the Champion, a few days ago, and tried one in a small stove. It burns as readily as ordinary charcoal, and we can see no good reason why it will not work equally as well in the furnace. Should the latter prove to be the case, a great deal of waste coal will be saved at a trifling expense.—*From the Lake Superior Mining Journal.*

The Lower California Expedition.—The San Diego *Union* of the 19th ult. says: "The schooner Fanny A. Hyde, with the Lower California Company's exploring expedition, arrived at this port on Tuesday morning, and, after the purchase of some supplies, sailed at five o'clock in the evening. Colonel DRAKE DE KAY, in charge of the expedition, informed us that this party will proceed to Magdalena bay, where they will land, and proceed to sink artesian wells and otherwise prepare for colonization in that section of their grant. We are also informed that the company intend, when colonization commences, to make San Diego a base of operations, this point possessing unequaled advantages, by reason of its geographical situation, affording means of access to the possessions by land and water, and telegraphic communication with the east. The movements of the Lower California Company will be productive of important results to this port.

The Mining Engines.—Messrs. M. BAIRD & Co., of the Baldwin Locomotive works, Philadelphia, have built during the present year a number of small locomotives for use in mines, hauling away cinder, etc. The engines referred to are miniature locomotives, adapted to narrow guages of 2½, or 3½ feet. The Thomas Iron works, Hokendauqua, the Lehigh Crane Iron works, Catasauqua, and the Glendon Iron works, Easton, are each now working two of these machines for hauling away cinder from their furnaces. At the former establishment the two engines do the work which formerly required thirty mules. The economy of their use is therefore manifest. For out-of-doors work, the little engines are built with outside cylinders nine inches in diameter, and twelve inches stroke; the driving-wheels are thirty inches in diameter. For mining purposes the cylinders are placed inside. The extreme width is reduced to about five feet, and the extreme height to five feet four inches. When running in the heading of a mine it is intended that coke shall be used as a fuel, so that little or no smoke or gas will be produced. These engines, in complete working order, with tank of water on boiler, and a man on the footboard, will weigh only from six to eight gross tons.—*Pottsville Miners' Journal.*

SPECIAL SCIENTIFIC BREVITIES.

Iridium, used as a coloring matter for glass and porcelain, gives a tint of intense blackness.

Nascent Carbonic Acid is being tried in France as a preventive of gangrene, and its use has been attended with success.

Electrical Experiment.—If two metallic conductors be placed with their points exactly opposite to a glass plate which turns easily in a plane on an axis, and positive electricity be passed through one and negative electricity through the other, the plate begins to rotate.

A New Mineral, named nadorite, discovered in the province of Constantine, Algiers, has been analyzed by M. PISANI. Its chief constituents are the oxides of lead and antimony. It also yields a small quantity of chlorine; and this is the chief point of the discovery; for no natural compound was before known in which chlorine was found in the presence of antimony.

Interesting About Diamonds.—In hydrogen gas the diamond can be heated nearly to the point of fusion of platinum without undergoing any change: it rather increases than diminishes in lustre. In carbonic acid it loses slightly in polish and weight, and the resulting gas contains carbonic oxide and oxygen; the carbonic acid is not decomposed by the diamond, but by the white-hot platinum, and the loss of weight in the diamond is due to partial oxidation.

Treatment of Cotton Fabrics.—A solution of tannin has been used in the treatment of cotton fabrics, as hides are in the manufacture of leather, and according to *Cosmos*, the cotton thereby acquires greater strength, and better resists moisture and disintegrating effects. No attempt is made to explain the chemical reaction which produces this important change, but it is believed that the change cannot be great, since it has escaped the notice of practical tanners.

Iodine from Chili Saltpetre.—Professor WAGNER, in his reports, says that the manufacture of iodine from Chili saltpetre already amounts to 30,000 pounds per annum. The method invented by THIERCELIN for its reclamation from the crude material is as follows: The mother liquors resulting from the manufacture of saltpetre are treated with a mixture of sulphurous acid and sulphide of soda, in proper proportion, and the iodine will be precipitatated as a black power. The precipitated iodine is put into earthern jars, on the bottom of which are layers of quartz sand, fine at the top, and coarse at the bottom; from this it is removed by earthern spoons into boxes lined with gypsum, and a greater part of the water thus removed. It is sometimes sold in this impure state, or further purified by sublimation.

Action of Vapors of Alkali Metals upon Molten Cast-iron.—By keeping the vapors of the alkali metals at a pressure of five and six atmospheres, and temperatures ranging from 200° to 250°, and introducing into the thus fused metals molten cast-iron, are produced alloys of iron and the alkali metals (potassium or sodium, or even alloys of these two). The discoverers, Messrs. G. GIRARD and J. POULAIN, describe at length the properties of the alloys thus obtained: and state that one of the practical applications of their labors bears upon the production of both steel and cast-iron of good and even superior quality from ores otherwise not well suited for smelting. Instead of the direct action of the vapors of sodium or potassium, the same result can be obtained on the large scale by adding to the iron-ore fuel and flux, a certain quantity of either chloride of sodium, or carbonate of soda, or the corresponding potash salts.—*Chemical News.*

Colors of Gases in Geissler Tubes Changed by Magnetism.—M. TREVE, in a late communication to the French Academy of Sciences, gives an account of his experiments with gases inclosed in glass tubes, and exposed to a current of electricity, and at the same time to the influence of a powerful electro-magnet. Having taken a Geissler tube filled with hydrogen, one portion of the tube being drawn out to capillary thinness, he caused the induction current to pass through it, which, as is well known, imparts to the gas in the thick part a blue color tinged with violet, and in the capillary portion a brilliant red. Now, if the latter be placed between the poles of the electro magnet, the red at once disappears, and is converted to white light. In the case of oxygen, the capillary part is milky white; under the influence of electro-magnetism it becomes red. Under the same circumstances the blue of nitrogen becomes much darker, and the sparkling white of carbonic acid turns blue. Hence, so far, magnetism is found to destroy or change the color of a gas in the capillary part of a tube containing it.

The Colorimeter.—M. DUBOSCQ of France has invented a new instrument for measuring the differences of tint in solutions. Two glass cylindrical vessels, containing the liquids to be tested, are placed side by side on a shelf; in each is a smaller tube closed at the lower extremity by a glass disk, which may be raised or lowered by means of a pinion having fastened to it a vernier moving over a graduated scale, so as to measure the distance between the bottom of the vessel and the lower disk of the movable tube. Luminous rays are transmitted through the bottom of the cylinder, by means of a mirror and by two Fresnal rombs above the cylinder, in such a manner that each will illumine half of the field with a semi-disk of yellow light more or less intense. These colors are observed with a terrestrial eye-piece formed of four glasses, by which the field may be illuminated with perfect uniformity. The colors are proportional to the height of the columns if the liquid contain the same proportion of caramel, or in proportion to the richness of the liquid in caramel if the two columns have the same height.

Sodium as a Flux for Minerals.—Metallic sodium is now made in such quantities as to have become a valuable reducing agent in the hands of chemists. We have previously published, says the *Journal of Applied Chemistry*, a notice of its use for the detection of sulphur and phosphorus in compounds, and the same author, Dr. SCHONN, now proposes to extend its use to the resolution of minerals in general. A steel crucible 1¼ inches deep and the same in diameter, is easily brought to glowing over an ordinary lamp; into this is projected a few pieces of metallic sodium, and afterwards the finely-divided and dry mineral is added. The crucible is then covered and heated red hot. As soon as the reaction is finished the contents of the crucible are allowed to cool, and water is cautiously added, sufficient for the purpose of filtration. The fused mass is then thrown upon a filter and thoroughly washed. In the filtrate will be found the electro-negative constituents of the mineral combined with the sodiums, such as sulphur, cyanogen, chlorine, chromic acid, silica, molybdic and tungstic acids, and such oxides as are soluble in soda lye. On the filter will be found the metals and their oxides, also the lower oxides of titanium, molybdenum, tungsten, and possibly silica and alumina. The contents of the filter and the solution in the filtrate can be further treated according to the order of analysis. In this way all minerals can be readily resolved, and their constituents determined either qualitatively or quantitatively.

MARKET REVIEW.

The Coal Trade.

NEW YORK, September 9, 1870.

WHOLESALE.—We see no reason to change our ideas from those given to our readers last week. There already appears in the Schuylkill district evidences of further trouble. Some twelve or fifteen collieries, who are dissatisfied with the rate of wages agreed upon for August, have stopped operations, and there is much fear that the strike will become general. When the miners entered into this last contract they had every reason to believe that coal was going to advance, or at least that the prices obtained would guarantee them at least $3 per ton at Port Carbon. But since much Schuylkill coal has been forced on the market, and sold at low figures, which brought the rate to $2 85 for August, and probably lower than this for September, they find that there is no money in the "basis," and threaten to stop. In fact they must stop, for it "can't be made to pay." Before anything further develops itself in the way of a strike, or any freshet happens, as occurred last year, to interfere with mining and transportation of coal, we urge dealers to come forward and make their purchases.

There has been a moderate trade during the past week, and prices have been fully maintained. Lehigh, broken, egg and stove coal are a little scarce; other qualities are in good supply.

RETAIL.—There is a good family and manufacturing trade doing.

FREIGHT.—Vessels are in better supply at the shipping points. We quote: Boston, $1 90; New Haven, $1.

Anthracite Coal Trade for 1869 and 1870.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending September 3, 1870, compared with week ending September 4, 1869.

COMPANIES.	1869. WEEK.	1869. TOTAL.	1870. WEEK.	1870. TOTAL.
*Phila. & Reading R.R.	113,761	2,229,439	118,156	1,888,286
Schuylkill Canal	4,655	450,949	30,816	166,681
Lehigh Valley R. R.	51,846	1,560,694	72,944	2,381,608
Lehigh & Sus. R. R.	24,465	559,690	34,831	835,254
Lehigh Canal	31,259	477,715	22,416	426,251
Scranton North	7,831	217,644	19,933	506,016
" South	9,775	636,691	28,303	1,181,344
Penn. Coal Co., rail	16,580	644,319	23,833	766,462
" " canal	716	12,042	498	13,537
Del. & Hud. Canal Co.	2,893	728,334	44,482	1,519,290
" " R. R.				
" " south		49,457	10,266	309,025
Shamokin	10,591	270,392	17,764	297,923
Trevorton	1,413	18,078	2,823	56,104
Lykens Valley Coal Co.	1,961	47,314	4,372	86,769
Wyoming South	3,765	183,990	10,714	199,419
Wyoming North	6,778	25,357		
P. N. Y. C. & R. R. Co.			6,651	209,309
Williamstown, Col'y	6,694	128,880	5,975	198,040
Short Mountain	2,166	70,661		
Big Lick Colliery			2,959	44,960
Total	300,743	8,391,642	457,636	11,080,267
1869				
Increase week and year.				11,030,267

* Less coal transported for Company's use and Bituminous coal.

Bituminous Coal Trade, 1869 and 1870.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Sept. 3, 1870, compared with week ending September 4, 1869.

COMPANIES.	1869. Week.	1869. Year.	1870. Week.	1870. Year.
B. & O. R. R.	19,671	659,061	22,937	642,788
C. & O. Canal	19,476	391,604	13,864	404,924
H. & B. T. R. R.	7,137	237,702	5,187	205,894
Harrisburg & D.	14,511	245,076	14,608	523,023
L. V. R. R.	....	....	519	9,899
P. & N.Y. C. & R. Co.	....	....	6,108	169,374
	60,795	1,533,443	63,223	3,455,902

Schuylkill Canal.

Report of coal transported over the Schuylkill Canal for the week ending Thursday, September 1, 1870.

	Tons. Cwt.
From Port Carbon	— —
" Pottsville	— —
" Schuylkill Haven	29,330 00
" Port Clinton	1,486 00
Total for week	30,816 00
Previously this year	135,835 10
Total	166,651 10
To same time last year	140,948 19

Philadelphia and Reading R. R.

Amount of coal transported on the Philadelphia and Reading Railroad for the week ending Thursday, Sept. 1, 1870:

From St. Clair	39,674 11
" Port Carbon	7,101 11
" Pottsville	6,568 09
" Schuylkill Haven	37,735 09
" Auburn	6,901 13
" Port Clinton	16,988 02
" Allentown and Alburtis	220 05
" Harrisburgh and Dauphin	14,608 10
Total paying freight	129,858 10
Coal for Company's use	2,906 08
Total for week	132,764 18
Previously this year	2,178,523 07
Total	2,311,288 14
To same time last year	2,769,103 12

Delaware, Lackawanna, and Western Railroad.

COAL Transported for the week ending Saturday, September 3, 1870.

	WEEK. tons. cwt.	YEAR. tons. cwt.
Shipped North	19,933 07	506,016 08
Shipped South	22,305 12	1,181,344 02
Total	42,239 19	1,687,360 10
For the corresponding time last year.		
Shipped North	7,831 08	217,644 02
Shipped South	9,775 15	636,691 09
Total	17,607 03	854,035 11
Increase	30,629 16	833,324 19
Decrease		

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company, for week ending Saturday, Sept. 3, 1870.

	WEEK.	SEASON.
North	44,482 12	1,519,290 04
South	10,265 11	309,025 11
Total	54,748 03	1,828,315 15
Corresponding time in 1869.		
North	2,892 18	728,334 03
South		49,457 04
Total	2,892 18	777,791 07
Increase North	41,589 14	Increase 790,956 01
Increase South	10,265 11	Increase 259,568 07
Total Increase	51,855 05	Increase 1,050,524 08

Report of Coal Transported by the Lehigh Coal and Nav. Co.'s Railroads and Canals,

Week ending September 3, 1870—Compared with same time last year.

WHERE SHIPPED FROM	WEEK, 1870. tons ct.	WEEK, 1869. tons ct.	YEAR 1870. tons cwt.	YEAR, 1869. tons cwt.
Wyoming Region	27000 16	30345 04	806312 14	515215 01
Upper Lehigh Region	3849 01		97678 01	77288 03
Mahanoy Region	97 03		1262 11	2254 06
Hazleton Region	8316 01	1230 19	194895 03	116158 06
Beaver Meadow Region	5091 02	6849 18	94815 00	78366 15
Mauch Chunk Region	12893 01	17208 02	66531 02	249382 16
Totals	57247 04	55724 03	1261504 11	1037405 07
Increase	1523 01		224099 04	
Decrease				
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	29412 07	23502 12	668152 17	517721 02
Forwarded East of Mch Chunk by Canal	22416 10	31258 12	426251 00	477715 05
Delivered at and above Mauch Chunk	739 15	962 19	28433 03	22124 11
Delivered to L. & B. R. R. at Plymouth Bridge	4678 12		138667 11	14493 06
L. V. R. R. at Sugar N.				5151 03
Totals	57247 04	55724 03	1261504 11	1037405 07
Of the above there was transported on acc'nt of L. C. & N. Co.	13680 19	18583 07	86761 12	272405 13
W.-B. C. & I. Co.	15441 03	14627 19	371076 00	266504 17
Totals	29102 02	33211 06	457837 12	540910 10
Increase				
Decrease	4109 04		83072 18	

Report of Coal Transported over Lehigh Valley Railroad

For the week ending September 3, 1870, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREV'LY. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Wyoming	10,841 08	436,108 08	446,949 16
" Hazleton	47,478 04	1,437,872 08	1,485,350 12
" Upper Lehigh	308 13	9,959 15	10,268 04
" Beaver Meadow	12,455 09	521,309 07	533,824 16
" Mahanoy	9,116 14	172,419 07	181,536 01
" Mauch Chunk	22 09	547 14	570 03
Total Anthracite	80,222 17	2,578,276 19	2,664,499 16
Bituminous Coal recv'd from Cata. R. R.			
N. C. R. R.			
E. P. R. R.	519 00	9,380 00	9,899 00
P. & N.Y. C. & R.R. Co			
Fall Creek			
Schroeder			
Towanda			
Total by rail and canal	86,741 17	2,587,656 19	2,674,398 16
Same time last year	62,536 04	1,715,302 09	1,777,840 13
Increase		872,354 10	896,558 03
Decrease	24,203 13		
Forwarded East from M'h Chunk by rail	64,349 14	2,058,737 13	2,123,087 07
Same time last year	52,798 11	1,478,739 08	1,531,537 19
Increase	11,551 03	579,998 05	591,549 08
Decrease			

RECAPITULATION.

Forwarded East from M'h Chunk by rail	64,349 14	2,058,737 13	2123,087 07
To N. C. R. R., at Mount Carmel	710 18	1.658 05	2,369 03
Forwarded North from L. & B. Junction	6,650 16	196,077 00	202,827 16
To L. & S. R. R. at Packerton for rail	131 08	5,612 01	5,743 09
Delivered at M'h Chunk	10 13	846 02	856 15
Delivered on line of road above Mauch Chunk	41 03	7,740 06	7,781 09
Delivered above M. Chunk for use of L. V. R. R.	1,049 11	37,892 03	38,941 14
To L. & S. R. R., at P'n Hav., for railroad			
Do. for canal	8,090 09	179,739 16	187,830 05
At M. Chunk for canal	5,188 05	89,873 13	95,061 18
Total Anthracite	86,222 17	2,578,276 19	2,664,499 16
Bituminous Coal	519 00	9,380 00	9,899 00
Total all kinds	86,741 17	2,587,656 19	2,674,398 16

Shipments of Cumberland Coal

for the week ending Saturday, September 3, and for the year 1870:

SHIPPED BY	B. & O. R. R.	C. & O. CANAL.	TOTAL.
Cooke M.	.....	.....	.....
Borden	1 536 17	1,642 08	3,179 05
Consolidation	4,942 12	3,614 14	8,557 06
Spruce Hill	515 10	.....	515 10
Midlothian	782 18	633 07	1.416 05
H. and Baltimore	38 04	246 18	285 02
do Va M	824 03	.....	824 03
V C & I Co	1,291 07	.....	1,29 107
G. C. C. and I.	1.067 19	.....	1,067 19
Maryland	1,411 07	3,489 12	4,900 19
American	1,214 00	4,237 11	5,451 11
Atlantic	1,414 03	.....	1,414 03
Piedmont	1,521 10	.....	1.521 10
Swanton	918 07	.....	918 07
Barton	842 00	.....	842 00
Potomac	1,905 00	.....	1,905 00
Franklin	1,280 08	.....	1,280 08
Big Vein	1,430 11	.....	1,430 11
Total week	22,936 16	13.864 10	36 891 06
Previous	619,851 02	391,059 06	1,010,910 08
Total year	642,787 18	404,923 16	1,047,711 14

Statement of coal transported over the Cumberland and Pennsylvania Railroad during the week ending Saturday, Sept. 3, and during the year 1870, compared with the corresponding period of 1869:

WEEK.

YEAR.	C. & O. CANAL. Tons. Cwt.	B. & O. R. R. Tons. Cwt.	TOTAL. Tons. Cwt.
1870	12,088 06	16,787 19	28,876 05
1869	16,964 12	21,794 18	38,759 10
Increase			
Decrease	4,876 06	5,006 19	9,883 05

YEAR.

YEAR.	C. & O. CANAL.	B. & O. R. R.	TOTAL.
1870	349,508 06	555 227 12	904,735 18
1869	391,604 11	659,061 06	1,050 665 17
Increase			
Decrease	42,096 05	103,833 14	145,929 19

Statement of coal transported over the Eckhart Branch Railroad, during the week ending Saturday, Sept. 3, 1870, and during the year 1870, compared with the corresponding period of 1869:

WEEK.

YEAR.	C. & O. CANAL. Tons. Cwt.	B. & O. R. R. Tons. Cwt.	TOTAL. Tons. Cwt.
1870	1,776 04	4,033 07	5,809 11
1869	1,993 07	3,541 12	6,534 19
Increase		491 15	
Decrease	1,217 03		725 08

YEAR.

YEAR.	C. & O. CANAL.	B. & O. R. R.	TOTAL.
1870	63,157 17	71,415 02	134.572 19
1869	49,027 02	73,118 01	122,145 03
Increase	14,130 15		12,427 16
Decrease		1,702 19	

Penn. and N. Y. Canal and Railroad Co.

REPORT of Coal Transported via. the Pennsylvania and New York Canal and Railroad Company, for week ending Sept. 3, 1870:

	WEEK.	PREVIOUSLY.	TOTAL.
Anthracite	6,650 16	196,657 19	203,308 15
Bituminous	6,108 00	163,266 00	169,374 00
Total, Ant. and Bit.	12.758 16	359.923 19	372,682 15

Pennsylvania Coal Company,

Shipments of Pittston Coal for the week ending Sept. 3, 1870.

	1870. WEEK.	1870. YEAR.	1869. WEEK.	1869. YEAR.
By Railway	23,833 02	766,462 08	16,570 12	644,319 10
" Canal	498 01	13,536 15	716 07	12,023 09
Total	24,331 03	780,019 03	17.295 19	656,347 19

Increase, 1870, 123,671 04 tons.

Harrisburgh and Dauphin Coal Trade.

The following is the amount of Bituminous Coal transported via the P. and R. R. for the week ending Sept. 1, 1870:

	Tons.
For week	14,608 10
Previously this year	508,414 13
Total,	523,023 03
Same week last year	14,511 09

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

SCHUYLKILL.	AT NEW YORK, September 9. R. A.	W. A.	AT PHILADELPHIA, September 9. R. A.	W. A.
Lump	$— —	$5 00	4 75	4 50
Steamer	— —	5 00	— —	4 50
Broken	— —	5 50	— —	4 50 to 4 75
Egg	5 75 to 6 50	5 50 to 6 00	— —	4 50 to 4 75
Stove	5 75 to 6 50	5 50 6 00	— —	4 50 to 4 75
Chestnut	4 50 to 5 60	6 25 6 75	— —	4 25 to — —
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side)cpd	6 10	— —	— —	— —
Broken	5 85	— —	— —	— —
Egg	5 85	— —	— —	— —
Stove	6 10	— —	— —	— —
Chestnut	5 25	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.*				
Diamond Vein	R. A. 6 50		— —	— —
New England	" — —		— —	— —
Locust Dale	W. A. 6 25		— —	— —
Honey Brook, Le'h	W. A. 4 75 to 5 75		— —	— —
Spring Mountain "	" 4 75 to 5 75		— —	— —
Sugar Creek "	" 4 75 to 5 75		— —	— —
Sugar Loaf "	" 4 75 to 5 75		— —	— —
Old Comp'y's "	" 4 75 to 5 75		— —	— —
Cross Creek "	" 4 75 to 5 75		— —	— —
Enterprise	"		— —	— —
Girardville	"		— —	4 75
McMichael	"		— —	4 75
Shamokin	"	5 50	5 25	— —
Lykens Valley	"	— —	5 75	— —
Broad Top	"	5 50	— —	— —
Hill & Harris	"	— —	4 75	— —
Henry Clay	"	— —	5 00	— —
Powelton	"	5 50	— —	4 75

[*Dealers in these coals may be found in our advertising columns.]

Prices for Coal at Mauch Chunk.

	F.L.	Bro.	Gra.	Eg.	Sto.	Cst.
Lehigh	$3 00	$3 75	$3 75	$3 75	$4 00	$3 00
Wilkesbarre	3 00	3 75	3 75	3 75	4 00	3 00

For freight to Elizabethport and to New York see "Freights."

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein...f.o.b. at Phila.		$5 00
Lemon	" "	4 75
Cumberland Vein Coal	" "	4 75
Cumberland C. & I. Co.'s on board	N. Y.	7 00
Maryland Coal Co.	"	7 00
Consolidated Coal Co.'s	"	7 00

Company Coals.

	L.	Str.	Gra.	Eg.	Sto.	Ches.
Scranton at E. Port	4 60	4 75	4 25	5 25	5 75	4 75
Pittston at Newburgh	5 00	5 00	5 20	5 30	5 50	4 70
Lackawana at Rondout	4 50	4 60	4 90	5 00	5 50	4 50
Wilk'b're at Hoboken	4 75	4 75	5 25	5 25	5 75	4 75
Old Co. Lehigh at Pt. Johnston	6 25	6 00	6 00	6 00	6 25	5 25
Lehigh at E. Port	5 75	5 50	5 50	5 50	5 75	4 75

For freights to different points, see "Freights."

Prices at Baltimore—September, 1870.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$5 30@5 50
Pittston and Plymouth, do	5 00@5 25
Shamokin Red or White Ash, do	5 50@6 00
Lykens Valley Red Ash, do	5 40@5 50
Zerba Valley	25 52—
By retail, all kinds per ton of 2240 lbs.	7 00@7 50
Georges Creek & Cumberland f. o. b. at Locust Point for cargoes	4 75@5 00
Fairmont and Clarksburg gas, f. o. b. at L. Point	5 35@5 50

Prices at George't'n, D.C., & Alexandria, Va.

September, 1870.

George's Creek and Cumberland f. o. b. for shipping..$4 55

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes	$— —@— —
Lykens Valley	— —@— —
Shamokin Red or White Ash	— —@— —
Trevorton and Zerba Valley	— —@— —

Prices of Gas Coals.

September, 1870.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr. 73 Pine st., N.Y.

Duty, $1 25, gold.

	Coarse.	Slack.
Block House	$1 75	@— 75
Gowrie	1 75	@— 75

Corrected by Bird, Perkins & Job, 86 South street.

	Coarse.	Culm of Coal.
Pictou	$2 25	@1 25
Sydney	2 25	@— 80
Lingan	1 75	@— 80
Little Glace Bay	1 75	@1 00
Caledonia	1 60	@— 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal.

AMERICAN.

	Coarse. Currency.	Slack
Fairmount Gas Coal Co. of N. Y.	7 50	@— —
Despard Coal Co	$7 50	@— —
Penn	— —	@— —
Newburg Orrel Gas	— —	@— —
West Fairmount Gas Coal	8 00	@— —

AT PHILADELPHIA.

Powelton	$7 80

Prices of Foreign Coals.

September, 1870.

Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street, New York.

Liverpool Gas Caking	$ 8 00@— —
" " Cannel	10 00@12 00
" House "	13 50@15 50
" " Orrel	12 00@14 00
Per ton 2,240 lbs., ex-ship.	
PRICES FROM YARD.	
Liverpool House Orrel, screened	$16 00@17 50
" " Cannel, "	18 00@20 00
Per ton 2,000 lbs. delivered	

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Port Carbon	$2 00
Less drawback of 80 cents on all Coal shipped east of New Brunswick and south of Cape Henry.	

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton	$ 84
C. R. R., N. J., Easton to Elizabethport	1 27
Shipping expenses at Elizabethport	25
Warfage	10
Total	$2 46

MAUCH CHUNK TO PORT JOHNSON.

L. V. R. R. or L. & S. R. R. from M. C. to Easton	$ 84
C. R. R., of N. J., Easton to Pt. Johnson	1 34
Shipping expenses	25
Warfage	10
Total	$2 53

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Easton	$ 84
Morris & Essex R. R. Easton to Hoboken	1 34
Shipping expenses	25
Warfage	10
Total	$2 53

TO SOUTH AMBOY.

L. V. R. R.	84
D. & D. R. R.	1 14
Cam. & Am. R. R.	
Shipping Expenses	25
Total	$2 23

PENN HAVEN TO ELIZABETHPORT.

L. V. RR. Penn Haven to Easton	84
C. RR. of N. J. Easton to Elizabethport	1 27
Shipping expenses	25
Wharfage	10
Total	$2 46

BY CANAL.

Via Schuylkill Canal.

TO PHILADELPHIA.

From Schuylkill Haven	$1 07
" Port Carbon	1 10
" Port Clinton	1 00

TO NEW YORK.

From Schuylkill Haven	$1 70

Via Lehigh Canal.

TO PHILADELPHIA.

Lehigh Canal	$0 70
Freight and towage	1 07
Total	$1 77

TO NEW YORK.

Lehigh Canal	$ 40
Morris "	1 10
Freight	
Towing	
Total	$ 2,50

TO JERSEY CITY.

Lehigh Canal	$ 40
Morris "	2 00
Freight	
	2 40
For re-shipment	2 20
Total	$4 60

Via Delaware and Raritan Canal.

TO NEW YORK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	35
Freight	1,25
Towage	20
Total	$ 2,50

TO NEW BRUNSWICK.

Lehigh Canal,	$ 40
Delaware Division Canal,	30
Delaware and Raritan Canal,	1,03
Freight,	55
Total,	$ 2,10

For Re-shipment—30 extra for shipping, and 10 cents. drawback.

Freights.—SEPTEMBER, 1870.

TO EASTERN PORTS.	From Philada's.	From E. Port and Port Johnston.	From Newberg	From Rondout
Amesbury	$2 50	$2 15		$
Bangor	2 80	1 90	1 60	
Bath	2 75	2 00		
Boston	2 50	1 90	2 25	1 90
Bridgeport	1 60	1 90	1 10	1 20
Bristol	2 50	1 40	1 40	
Cambridgeport	2 50	1 40		
Derby	2 00	1 20		
Dighton	2 30		1 45	
East Cambridge	2 30	1 40		
Fall River	2 30	1 40	1 40	
Hackensack	1 75	1 50		
Hartford	2 50	1 35		
Jersey City	1 35 to 1 50	1 55	60	
Middletown	2 25	1 40		
Mystic		1 25	1 30	
New Bedford	2 35	1 40		
Newburyport	2 50	2 10		
New Haven	1 70	1 00	1 10	1 20
New London	2 00	1 20	1 25	1 30
Newport	2 30	1 40	1 40	
New York	1 35 to 1 50	1 60	70	
Norwalk	1 80	1 60	1 05	
Norwich	2 30	1 25	1 35	1 40
Pawtucket	2 30	1 50	1 60	
Portland	2 75	1 75		
Portsmouth, N. H.	2 90	2 10		1 85
Providence	2 30	1 40	1 45	1 45
Rockport	2 10			
Saco	2 75	2 10		
Sag Harbor	1 70	1 40	1 30	
Salem	2 50	1 90	2 25	2 35
Stamford	2 00	1 00	1 00	
Stonington	2 00	1 30	1 25	
Taunton	2 30	2 00		
Warren		1 40	1 45	
Washington	1 50			
TO RIVER PORTS.				
Albany		90	60	
Catskill			50	
Cockaackie			50	
Coeyman's			75	
Cold Spring			35	
Fishkill			30	
Haverstraw		50	60	
Hudson			50	
New York			70	
Nyack		60	60	
Poughkeepsie			35	
Rhinebeck			30	
Rondout				
Saugerties			40	
Sing Sing			75	
Stuyvesant			55	
Tarrytown		80	75	
Troy		90	75	
West Point			35	
Yonkers		40	60	

METALS.

NEW YORK, September 10, 1870.

IRON.—Duty: Bars, 1 to 1¼ cents ₱ lb; Railroad, 70 cents ₱ 100 lbs.; Boiler and Plate, 1½ cents ₱ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ₱ lb; Pig, 9 ₱ ton; Polished Sheet, 3 cents ₱ lb.

	Store Prices.
Pig, Scotch No. 1, ₱ ton	31 00@35 00
Pig, American, No. 1	32 00@34 00
Pig, American, No. 2	30 00@31 00
Pig, American, Forge	27 00@29 90
Bar, Refined, English and American	— —@75 00
Bar, Swedes, assorted sizes (gold)	85 00@100 00
	Store Prices, Cash
Bar, Swedes, ord'y sizes, less 5 ₱ ct.	— —@110 00
Bar, Refined " "	80 —@ 85 00
Bar, Common " "	75 00@ 80 00
Scroll " "	97 50@130 —
Ovals and half-round " "	100 —@125 —
Band " "	95 —@ — —
Horse Shoe " "	95 —@ — —
Rods, ¼ to 3-16 inch " "	85 —@120 —
Hoop " "	105 —@150 —
Nail rod, less 5 ₱ ct.	— 7 @—7½
Sheet, Russia, as to Nos. (gold)	— 11½@—13¾
Sheet, Single, D. and T. Common	— 5 @— 6
Sheet, Galv'd, Nos. 14 to 26 10 and 12c. Nos. 27, 28, and 29, 13@14	
Rails, English (gold), ₱ ton	59 00 @60 00
Rails, American, at Works in Pa	70 00 @71 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ₱ ₱ or under, 2½ cents; over 7 cents and not above 11, 3 cents ₱ lb; over 11 cents, 2½ cents ₱ lb, and 10 ₱ cent ad val. (Store prices.)

English Cast (2d and 1st quality)	₱ lb	— 15 @— 18
English Spring (2d and 1st quality)		— 7 @— 10
English Blister (2d and 1st quality)		— 10 @— 17
English Machinery		— 11½@— 14
English German (2d and 1st quality)		— 13 @— 15
American Blister "Black Diamond"		— — @— 12
American, Cast, Tool	do.	— — @— 18
American, Spring	do.	— 9 @— 11
American Machinery	do.	— — @— 12
American German	do.	— 9 @— 12

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 20 cents ₱ lb; Manufactured, 45 per cent. ad val.

		All Cash.
Copper, New Sheathing	₱ lb	— @— 30
Copper Bolts		— @— 30
Copper Braziers, 16oz. and over		— @— 30
Copper Nails		35 @— 36
Copper, Old Sheathing, &c., clean		— @— 17
Copper, Chili Pig		— @— —
Copper, American Ingot		20¼@— 21
Yellow Metal, New Sheating		— @— 22
Yellow Metal Bolts		24 @— —
Yellow Metal Nails		— @— 22

LEAD.—Duty: Pig, $2 ₱ 100 lbs.; old Lead, 1½ cents ₱ lb; Pipe and Sheet, 2¼ cents ₱ lb.

Galena, ₱ 100 lbs.	$— —@— —
Spanish (gold)	6 32½@6 45

German, do.	6 37½	@6 45	
English, do.	6 37½	@6 62½	
Bar (net)	— —	@8 50	
Pipe and Sheet (less 10 per cent)	— —	@9 50	

TIN.—Duty: Pig, Bars, and Blocks, 15 ℔ cent. ad val.: Plate and Sheets and Terne Plates, 25 ℔ cent. ad val.

	Gold ℔ lb.	
Banca	37	@37½
Straits	36	@36½
English	32¼	@32½

PLATES.

Fair to Good Brands.	Gold.	Currency.
I. C. Charcoal, ℔ box	$8 75 @9 —	$10 50 @11 —
I. C. Coke	7 50 @8 —	9 25 @ 9 75
Coke Terne	6 00 @6 75	7 25 @ 8 00
Charcoal Terne	7 75 @8 —	9 50 @ 9 75

SPELTER.—Duty: In Pigs, Bars, and Plates, $1 50 ℔ 100lb

	Gold.	
Plates, Foreign ℔ 100 lbs.	$6 37½	@ 6 50
Plates, Domestic ℔ lb.	08½	@- 11½

REMARKS:

IRON.—The market for Scotch Pig has been rather quiet since our last, and prices are irregular, the Trade being unwilling to purchase at present rates, and holders refuse to make further concessions. We notice sales of 450 tons Eglinton, ex ship, part at $31, and 50 do. Gartsherrie, $34. American is without movement, but prices are unchanged. Rails meet with very little inquiry, and prices for New English are easier. We quote: $57 @ $59, gold: the sales are 100 tons old Double-headed at $39 50, gold, and 250 do. T, to arrive on private terms. Refined Bar from store continues very inactive at our quotations. Russia Sheet continues quiet, the sales being only in a small jobbing way at about our quotation.

COPPER.—New Sheathing and Yellow Metal are steady at 30 cents, and 32 cents, cash. There has been a good demand for Ingot for consumption and the market has ruled very firm; sales 2,500,000 lb. Lake, part on the spot, but mainly for forward delivery up to the end of the year, at 20¾ @ 21 cents, cash, and 21 @ 21¼ for future delivery. Baltimore is dull and nominal at 20½ @ 20¾ cents. The stock is small, and the smelting works are not working at present.

LEAD.—The demand for Foreign continues light, and prices are a little lower. We quote: $6 37½ gold for ordinary Spanish. Bar, 3½ cents net, and Sheet Pipe at 9½, less 10 ℔ cent. to the Trade. One manufacturer, who was not a party to the agreement reported in our last, still quotes Bar, Sheet and Pipe 8¼ cents, net cash.

TIN.—Pig is very quiet and rather nominal at previous quotations. Plates are in fair demand, and very steady in price. The sales are 250 boxes Charcoal Tin at $8 87½ for I. C.; 750 do. I. C. Coke, 14 by 29, $7 62½ @ $7 75; and 1,800 do. Charcoal Terne, $7 75 @ $8, all gold.

ZINCE.—Am. Oxide, 6½ @ 7; French do., 11 @11½; Sheet do., 10 @ 10½.

MANGANESE—4 @ 4½ cents.

Mining Stocks.

NEW YORK, Sept. 8, 1870.

Colorada stocks are stronger, with reports of but few transactions. The list of prices below, as a whole, shows a general advance in prices:

	Bid.	Asked.
Bates and Baxter	15	—
Benton Gold	5	6
Black Hawk Gold	—	40
Central Gold	18	21
Consolidated Gregory	80	1 25
Grass Valley	20	27
Gunnell Gold	17	—
La Crosse Gold	10	—
Liberty	—	02
Quartz Hill	20	25
Symond's Forks	—	75
Smith & Parmelee Gold	55	75
Manhattan	50	1 40
Minnesota	50	—
Wa kill	3	—
Walkill assented	5	—
Rutland Marble	—	25 00
Lehigh and Sus	1 00	—

The following are the prices of Petroleum stocks, as reported at the Mining Stock Board:

	Bid.	Asked.
Bennehoff	25	40
Bergen Coal and Oil	40	—
Blood Farm	50	—
Buchanan Farm	45	—
Central	50	60
Home Petroleum	1 00	—
N. Y. and Alleghany	2 00	—
National	10	—
Northern Light	—	15
Pithole Creek	1 00	1 40
Phillips	15	25
Rathbone	—	40
Rynd Farm	28	31
Second National	—	75
United Petroleum Farms	15	—
United States	—	75

San Francisco Stock Market.

A telegram from California, dated Sept. 4, quotes:

PER SHARE.	First Board.	Second Board.
Savage	38	—
Crown Point	6	—
Jellow Jacket	28	—
Kentuck	37	—
Chollar Potosi	47	—
Gould & Curry	115	—
Ophir	6	—
Alpha	4	—
Belcher	3	—
Imperial	23	—
Hale & Norcross	88	—
Amator	—	—
Empire Mill	1	—

From our Special Correspondent.

The Slate and Marble Interests of Vermont.

THE Eagle Quarry employs about twenty men. The engine is a new one of about one hundred horse-power, and has been running only a month. It was built at the Fishkill Landing Iron Works, and has a variable cut-off. A caloric engine is used in the quarry. The mill turns out between 8,000 and 10,000 feet of slate stock monthly, all of which is sawed and planed. The colors are purple, green and red. The latter is obtained from a quarry in Granville owned by this company.

The mill is about one hundred feet long by thirty-eight feet wide, with an addition not yet completed, thirty-six by thirty-eight feet. Marble is also worked here, and a good deal of tiling turned out. Eighty men are employed about the quarry.

THE AMERICAN SLATE-PENCIL WORKS.

The slate-pencil factory at Castleton, Vermont, is located at the foot of a wild glen among the hills. The stone is an extremely pure argillite, and of a quality not found in any other part of the world. There are a great many requirements for a good pencil-stone, the absence of any one of which is sufficient to ruin the pencils. Indeed, it is not rare to find that stones taken from the quarry at one time, apparently of the same quality, differ so widely that some are utterly useless. These differences can be detected by the practised eye, but to a stranger are utterly invisible.

The factory is capable of turning out, when pushed to its utmost, about 100,000 pencils per day. The pencil-machines are the invention of Mr. BROWN, the superintendent. The pencil-dust is extensively used by paper-makers for filling paper pulp. The slate-pencils, made like lead-pencils, by having the slate inclosed in cedar, are made from this stone, reduced to a fine powder.

THE VILLAGE OF MIDDLETON

is situated on the Poultney river, eight miles from Poultney. Nestled down among the mountains of the Taconic Range, it is completely isolated from the outside world. Until quite recently its only dependence for business was the shop where horse-power machines were manufactured. Some two years since mineral springs were discovered near the bed of the river, and since that time the place has been rapidly built up as a place of summer resort. There are two hotels, one of which is not yet finished. The waters here are strongly impregnated with iron. A. W. GRAY & Son manufacture machines for utilizing horse-power. They have a large two-story building in which most of the wood-work is done, and the machines put together and painted. A few hundred feet distant is a house where the finished machines are stored. During the busy part of the season a complete "set" is shipped every day. The capacity of the works is about 175 machines per year. They also turn out circular saws, threshing-machines, separators, etc., in fact most of the machines used with horse-power on a farm. The average value of a "set" is about $300 or $350. Thirty men are employed. The Poultney River, which gives by means of a long raceway cut in the bank, a fall of about thirty feet, furnishes the power for the works. The establishment has been running about fourteen years.

MIDDLE GRANVILLE,

In the State of New York, is twenty-six miles from Rutland, Vt. It is situated on the Meltowee river, which furnishes considerable water-power for the mills of the town. The river, which takes its rise among the mountains of the Taconic range, flows north through the village and empties into Lake Champlain at Whitehall. The town of Middle Granville is the most southern of the slate producing towns of this section.

The village has about fifteen hundred inhabitants. Its population has been largely increased within a few years by immigration from Wales.

The quarries extend for a long distance, between Middle Granville and Poultney.

The chief slate companies at this place are the Penrhyn Slate Company, New York Slate Company, American Slate Company, and Middle Granville Slate Company.

The principal company is the Penrhyn. The chief owners are WILLIAMS and GUION of the steamship line. The company makes roofing slate in great quantities; they do all the marbleizing that is done here, and usually employ about two hundred men, though just now, owing to the dullness of trade, not more than half of their complement is at work.

The building of this company, taken all together, occupy a space of some three hundred or four hundred feet long, and are probably as well appointed mills as any in the country.

D. S. MILLER & J. GOULD, are the chief owners of the New York Slate Company. This company is not running now and has not been doing much for the last six or eight months. Their best quarry has been recently leased on contract and is now being worked at so much per square foot.

The Middle Granville Slate Company is a local company. It was organized in 1861. The first excavation was made in 1853. The property is situated in the centre of the slate deposits of the town. Until the late dullness of trade, this company has produced forty or fifty squares per day; now, however, they are running only fifty men or thereabouts. The American is running about the same number.

Last year this town shipped a larger amount of slate than any other town on the R. & W. railroad.

The Eagle Slate Company owns a red quarry in this town, and are just getting up an engine to work it. The red slate, as is pretty well known, is a rarity and is not found outside of this slate region. It is only used for ornamental work, contrast, tiling, slating, etc. On this account it always commands an extra price in the market.

The Strawboard mill in this town has been recently purchased by L. DOGE & Co., large owners of strawboard mills in Cohoes and other towns in New York. They will probably be able to turn out two tons per day when the mill is ready to run. Many of the mills here are run by water-power. The American, New York and Eagle Company's, however, run steam engines.

The slate from this section is of very fine quality, good color, and makes excellent mill stock.

RUTLAND

Is situated on Otter Creek, just at the foot of the Green mountains. Indeed, the town is built on the spurs of the Green Mountains. Directly in its front are the Taconic Mountains, a chain running parallel to the Green Mountains, and which at this point have a gap through which the Western railroads pass. Rutland is Vermont's railroad centre. Three routes to New York, two to the West, one North, and one North and West, and one East, show the importance of this little, growing village. In any other State it would be a city. But in this State, when a place is not quite ready for a city charter, they give it what is called a village organization—which is a medium between a town and city government.

Commencing at the north of the town, on the line of the railroads, is situated the Steam Stone-Cutter Company. They build all sorts of channelling machines and engines for cutting out stone. The power for the shop is furnished by a small engine built by CLUTE BROTHERS, Schenectady, N. Y. The lathes used are all built by the Fitchburgh Machine Company. The factory is 40x100 feet, two stories high in front and one in the rear. They can turn out from twelve to fifteen channelling engines in a year. These engines are working a complete revolution in the getting of stone from quarries. The amount of saving in a block cut out on four sides by a machine is sometimes 25 per cent. over one which is cut on two sides and split in two. This, in a quarry where stone as valuable as marble is taken out, is an immense saving.

The greatest amount of work ever done by one of these mechines in a day (twelve hours), was 155¾ feet, which is equal to the work of 103 men. Of course, this was an exceptional case; they average, however, the work of 40 men, or 60 feet. A channel is estimated by multiplying the length by the depth—the thickness always being supposed to be one inch. One of these machines has cut 3,420 feet in twenty-six successive working days and nights. This was distributed over ten different channels; this was a double quarry machine of the old pattern.

THE LINCOLN IRON-WORKS

are owned by Messrs. THOMAS ROSS & Co. The works are situated on the line of the railroad, which leads North from Rutland, and have made marble and quarry machinery a specialty. They are now building some steam engines. A foundry attached to the establishment does all the casting, and is capable of turning out about four tons of castings per day. The machine shop is 115x40 feet, two stories high. The foundry is 40x70 feet, large enough, and admirably lighted. The tools, such as lathes, planes, etc., are mostly from the Fitchburgh Machine Works. The engine which drives the machinery was built by the proprietors in their establishment before the present works were completed. It is a forty-horse upright machine, with two slide-valves, exhaust, and steam-cylinder jacketed, and, taken all in all, runs as finely as could be wished.

The repair shops of the Rutland railroad are located here, and in every respect are well appointed and convenient. These shops do all the repairs of this road and all of its branches. The road itself extends from Burlington to Bellows' Falls. Besides this, they have leased 25 miles of road below the latter place, which they run in connection with their own road. They also have the new road on the west side of Lake Champlain, Whitehall, and Plattsburg—making, in all, 187 miles of road, the repairs for which are all done in the shops here. There is also a steamboat line crossing Lake Champlain, which is owned by the road, and used for the transportation of trains from Burlington to Plattsburg. The road, of which Rutland is the central station, has thirty-six engineers and as many firemen. The number of locomotives is forty-one. These are all repaired at the shops in Rutland, for though there are shops elsewhere for trivial local repairs, all the important repairs are done here. Of these forty-one engines, eight are new. Though the shop is closely run with repairs all the time, Master Mechanic H. L. DAVIS manages to turn out more than one new engine per year. The road has about 1,000 freight cars, 18 passenger cars, and 10 express and baggage cars. The main shop is 60x200 feet, lofty, well lighted, and well supplied with tools. Though usually pretty busy, at the time of our visit there were only two locomotives in the shops. A new engine, the J. M. HAVEN, which has just been turned out, would do credit to the best establishment in the country—the expense being some $3,000 less than the same machine would cost had it been bought ready made. The engine (forty horse-power) which furnishes the power to the works, was built by the Putnam Machine Works of Fitchburgh, Mass., some twenty years ago, and it would be difficult to find an engine of more modern date doing its work with greater ease or quietness. The boilers are by Messrs. KENDALL & ROBERTS, of Cambridgeport, Mass. The round-house is 166 feet in diameter, and has accommodations for seventeen engines. The dome which surmounts it is nearly 100 feet high, and is one of the most elegant in the country.

One department of great interest was the tool shop, a neat room at the end of and opening into the machine shop. Here all the drills, dies, taps and reamers are kept, and here too they are all made. One man is kept constantly at work on them, and it would be difficult to find a finer set of tools than those kept for constant use. Below in the lockers were spare new sets of all the kinds of tools used in the shop; as fast as these are used up they are replaced by making new ones. This, of course, is an enormous saving in an establishment like this. Here, too, every workman comes when he wants a tool, and leaving a check for it, takes it away, becoming, of course, responsible for it. When done, he returns it and takes his check. This insures the safety of the tools, and every man knowing where to go for his tools, no time is lost in hunting them up. Connected with the machine shop is a large forging shop, with trip-hammer, blowers, and all complete, and close by a boiler shop, in which not only repairs are made, but new boilers are built. The car shop is 80x180 feet; the wood-working shop connected with it 50x60. This we thought worth note, as it was so well arranged, well lighted and warmed. There are in it the usual saws, etc., two Daniels' planes, an upright planer and a shaping machine. The blacksmith shop has five fires and a trip-hammer. These shops, connected with the car-building department, employ about fifty men. There is a forty horse-power engine, similar to that furnishing the power to the other shops, that drives the machinery here. Mr. A. B. ALLEN is the superintendent of the car shop. Chiefly under his direction has been built the new drawing-room car, "Queen City," just out of the shops here. In finish and "style" it is equal to anything turned out farther away from home at double the cost. The folding-tables with which the car was furnished were especially worth notice. They are of a new design by Mr. ALLEN, and about the best thing in the line that we have seen. The car seats thirty-eight persons, with room for twelve to sleep. The finish is black walnut, red cedar, and satin-wood, and is very elegant. The cost is probably inside of $6,000. In all there are ten shops, including a rail-straightening shop of four fires. Master-Mechanic DAVIS' rule, from which there is no deviation whatever, is to have things all the time in the best possible repair. Nothing is allowed to run as long as it will, but is put in order at once. The shops, yards and grounds about are as neat as can be; no scrap-heaps in corners nor clutter of any kind is allowed. Large lumber-sheds and houses are constantly kept stored with lumber for the use of the road.

The Rutland Foundry, a very large establishment, was formerly devoted to general machinery, but is now running on car-wheels alone. At the time of our visit the works were closed.

The Eagle Foundry and Machine Works are owned by Messrs. MANSFIELD & STIMSON. The works are near the depot. A small steam engine furnishes the power. They make lathes, portable engines and boilers, and steam channelling engines. They pay special attention to hoisting machinery, derricks, etc., for quarries, both making and repairing. These works are now building a machine for carving stone, for Messrs. FLETCHER & BLANCHARD, of Brideport, Vt. The works sometimes employ fifty men and cover three acres of ground; have a foundry, forge and blacksmith shop, etc.

Besides these, Rutland has several establishments for working wood on a large scale; also several mills where marble is worked up into shape. A few miles from the village, on the line of the railroad, Messrs. RIPLEY SONS have a factory for making concrete drain tile. They are doing a very good business. At Centre Rutland are several large marble mills, where marble from West Rutland and Sutherland Falls and other places is sawed.

The Discovery and Production of Gold in California.

By Professor ROBERT VON SCHLAGINTWEIT.
Translated from the German by ROBERT HEUSCHKEL, M. E.
[Continuation.]

EXPERIENCE very soon proved that the expectations concerning the inexhaustibility were too exalted. The upper gold-bearing layers were washed through sooner than expected, so the miner was obliged either to dig deeper, and to remove often very thick layers of entirely worthless materials to reach the golden bed again, or to work out tunnels at the expense of both time and money.

Under such circumstances, of course, the process in use was not profitable. A process had to be found for washing in the shortest possible time the largest amount of dirt, which would yield quite a considerable production, although the particles were small, and the dirt far less rich. One man could no longer work alone with success; several persons had to join together to undertake in co-operation more costly works. The first apparatus constructed were the "sluices," inclined channels, made of rough, unplaned boards, nailed together like boxes, and having a length of sometimes fifty, often a hundred, frequently of several thousands of feet. The inclination of those sluices depended upon local circumstances, the quantity of water at disposition, and the character of the dirt to be washed. The more cemented the latter, the steeper had the sluice to be laid. The gold consisting only of very fine grains is caught best on very long sluices. The sluices seldom lay on the ground, but were supported by huge jacks over mountains and valleys. They, as well as the supporting frames, are easily taken to pieces and transported to any place where they are wanted. To the upper, more elevated part of the sluice, which might be considered as an elongated and consequently improved Long Tom, the dirt is brought and washed by a number of powerful streams of water, which has been conducted, often over a considerable distance, by means of artificial works. As a matter of course, these sluices are, at the beginning of the first "run," not at all tight, but the numerous leakages are soon filled up, by the considerable swelling of the wood and the deposition of mud.

The sluices have, besides the real bottom, often a false one, arranged from three to seven inches above the lower one, and consisting of boards punched by many holes and crossed by lathes, "rifle-bars," which are partly covered by globes of quicksilver, and partly by sheets of copper amalgamated and bearing free quicksilver. A "run" lasts without any interruption from six to ten days, sometimes even four weeks. That is to say, during this time the pay-dirt, intermixed with worthless mud, clay and pebbles, is brought into the sluice and washed. At a fixed day the work is interrupted, and a stream of water for some time allowed to run through the sluice in order to sweep away all worthless materials, until the space above the false bottom is nearly clean. The latter is then removed, and the larger gold nuggets, as well as the amalgamated product taken away. The California miner expresses these latter manipulations by the words "to clean up," and all parties concerned in it exhibit more or less excitement, which changes, according to circumstances, either to joy or sorrow.

A sluice requires watching by day and by night, to prevent the stealing of fine specimens of the precious metals. Every one who ventures near a sluice in night time runs the risk of being shot. The more they learned how important the water was for the production of gold-bearing deposits, the more attention had to be paid to making the best use of it. That was done particularly by the introduction of the "hydraulic process," the best and most advantageous treatment of dirt for the production of gold in use up to the present time. The hydraulic process not only diminished considerably the expenses, but saved considerable labor, and enabled the men to wash large quantities of ground in much shorter time. The water was collected in large reservoirs, frequently by separate companies, high above the working place, and led down mostly in tubes (flumes), which were divided into several pipes, with a fall of from fifty to one hundred feet. The enormous power of such a stream, in consequence of the high pressure from above, is used either to sweep the more or less hard ground from the solid rock, or to soak the ground which has been loosened already by manual labor, and conduct it down to the sluices. It is difficult to form a correct idea of the immense power of the water, and of the gigantic work it has to perform. Long before we reached the deposit worked by the hydraulic process we heard a singularly dull noise, produced by the falling masses, sometimes drowned by the singular hissing of the water. Coming nearer, we observed a very captivating picture. Here and there the masses came thundering down.

Since the pipes the water runs through are movable, any required direction may be given to them. The lower end is armed with a strong iron or brass mouthpiece, comparable to the barrel of a cannon, the diameter of which is from four to ten inches. The mouth is always somewhat smaller, in order to increase the power of the stream, which is sufficient to kill a man or any animal within its reach.

The hydraulic is not altogether without danger for those who employ it, and yearly quite a considerable number of accidents occur in consequence of it. The effect of a number of streams directed towards the slope of a hill can never be predicted with complete security. Often great masses come down unexpectedly, and bury those workmen who are employed at the nozzle of the pipe. Their comrades, in such a case, have to unearth them through the help of another stream of water, but often they are too late.

The hydraulic process requires but a few hands, and gives astonishing results; it is better in winter than in summer time, because the cold season brings much rain, and loosens and soaks the ground, which is then easily carried off by a strong stream of water. Besides this, gigantic blasts are often made use of with considerable results. For this purpose adits are excavated and charged with thirty, forty, even with a hundred quintals of powder. Dynamite, the so-called giant-powder, is also sometimes used. Hills are often shaken to their very foundations, so that they are worked with water afterwards.

It is a matter of course, that the expense of starting the hydraulic process is so great that it can be made use of only by companies. Particularly, the amount to be paid for the use of the water is quite considerable. The reservoirs, as well as the tubes, belong to different companies.

What results may be gained by using the hydraulic process may be proved by the following: A quantity of ground, yielding at an average one cent's worth of gold in one cubic foot of material, can be worked very profitably. The exact statistics of a company show that the production of a gold-bearing deposit, with an average yield of 1 1-5 cents worth of gold per cubic foot, after deducting the expenses for the workmen, water, implements and chemicals (in particular, quicksilver), left a nett profit of $360 to $400 gold per day.

For the sake of completeness I have to mention the "river mining," that is, the manipulations in use to gain the gold in the channel of a river artificially drained. The water is mostly turned off through wooden pipes (flumes), which are so arranged that they lie either in the channel itself or alongside of it. Sometimes the water is led into trenches dug for that purpose, which, in a singular manner, reminded me of similar works I had seen in Thibet, particularly in the valley of Nubra.

The application of flumes can be made use of only at low water, and consequently the mining in a drained channel is confined to a certain season. During the winter time the process cannot be used, since in California, as in the tropics, this is the rainy season. Shortly after the discovery of gold the nuggets were so numerous that sometimes we could collect them with the hands, or dig them out of the crevices with a knife, and save the trouble of washing; but often we had to search carefully, and oftener found large districts entirely destitute. The idea of using a diving bell or drag nets was repeatedly suggested for the examination of the channels, before draining them, but the application of either might prove rather difficult, since the California streams, the bottoms of which are composed of loose conglomerates of all descriptions, have generally only a few feet of water, but a very strong current. The drainage of a river is frequently accompanied with many an unforeseen accident. The power of the water breaks the flumes, sometimes the river rises and overflows the banks, and in both cases the original channel is filled.

Soon it proved to be an erroneous idea that a channel, having gone through the process of washing, could not be searched for gold once more. In course of time many a river carried down the tailings from mines situated on it. All clods which had resisted the hydraulic process or the sluices, were finally decomposed by water under atmospheric influences, and the gold contained in them laid bare. In 1864 a miner sold 3,000 feet of the channel of Deer Creek, below the town of Nevada, which had been searched through, for what he thought the high price of three hundred dollars. After the expiration of a few years, it proved to be worth several thousand dollars.

[TO BE CONTINUED.]

Land Office Fees for Mining Claims.

DEPARTMENT OF THE INTERIOR,
GENERAL LAND OFFICE, July 25, 1870.

GENTLEMEN: Information has been called for as to the fees to which Registers and Receivers are entitled for services in acting upon mining claims. The following is therefore communicated for the government of all concerned:

In the 15th section of the Act of Congress approved July 9, 1870, "To amend an act granting the right of way to ditch and canal owners over the public lands, and for other purposes," it is declared "That Registers and Receivers shall receive the same fees for services under this Act as are provided by law for like services under other Acts of Congress."

Now, the Mining Act is substantially a pre-emption law, as the occupant, under the local customs of miners, is the only person privileged to purchase, and an application for a patent under the mining statute assimilates to a declaratory statement in the case of entries under the general pre-emption law.

It is, therefore, proper to apply the provisions, as to the fees in general pre-emption cases, to the special pre-emptions under the Mining Act. Hence, Registers and Receivers in the States of California, Oregon and Nevada, and in the Territories of Washington, Colorado, New Mexico, Arizona, Idaho and Montana are entitled to charge applicants for mining patents at the date of filing the diagram or making the application, the sum of three dollars, being one dollar and fifty cents each to the Register and Receiver.

For taking testimony, either in the form of affidavits or in writing out the answers of witnesses, they are allowed a joint charge of twenty-two and one-half cents per hundred words, these being the fees specified in the Act of Congress approved 21st March, 1862, "Amendatory of the Homestead Law, and for other purposes" (U. S. Statutes, vol. 13, p. 35) which we assimilate to services as to mining claims.

Then the claimant has to pay the expenses of surveying the claim and making a plat thereof, the cost of the publication of the notice in the newspaper, and five dollars per acre for the surface ground embraced by the survey.

Such are the items of expense incident to obtaining a patent for a mining claim, so far as the United States or its officers are concerned.

From the foregoing it will be seen that the fees payable to the Register and Receiver by the mining applicant are:

I. $1 50 to each for filing diagram and application.

II. 22½ cents per hundred words for reducing testimony to writing, under the principle laid down in the 4th and 6th sections of the Homestead Act of March 21, 1864, should the applicant desire it taken down by these officers, instead of by themselves or other persons, in the presence of the Land officers.

The other payments required of applicants for mining patents are:

III. To the Receiver the sum of $5 and $2 50 per acre, respectively, for lode and placer claims, as shown by the final survey; and

IV. A deposit, in favor of the United States Treasurer, according to existing instructions, of the amount estimated by the Surveyor General to cover the actual expenses of survey, plat, and cost of publication of notice.

These are the only charges, fees, or emoluments, which, by law or regulations, the Register and Receiver have any right to exact from the mining applicant, and none other must be charged or received under any circumstances.

You are requested to acknowledge the receipt of this communication, and to be strictly governed by the terms mentioned therein. Very respectfully, your obedient servant,

JOSEPH S. WILSON, Commissioner.

Wanted, Protection Against Industrial Quackery.

THE abundant and economical production of good iron and steel, perhaps the most important industrial problem of the age, is embarrassed by manifold and stubborn difficulties. Many of the best deposits of ore and coal are remote from commercial and manufacturing centres. Ores differ vastly in composition, and the same mine may be free from harmful ingredients in one part, and fatally full of them in another. Thus vast and costly scientific and experimental researches into the nature and capacities of each mineral deposit become necessary. Iron and steel-working machinery are peculiarly expensive, and the constant improvement of tools and processes involves as constant reconstruction. Then the question of labor in this manufacture is peculiarly involved and unsettled. All these things and many more, both scientific and commercial, impede the progress of new inventions, but the most stubborn and annoying embarrassment that improvements have to encounter, is editorial advertising in the New York *Tribune*. Some months ago, this great authority on metallurgy egregiously puffed, in a leading column, the wonderful invention of a Dr. FIELD, by which all other iron and steel processes were to be superseded, by which the furnaces of Great Britian were to be shut up, and by which some of the most miraculous things unknown to science were to be performed. Among others, iron castings were to be made "five times as strong as those produced by the old processes"—a simple physical impossibility, which the inventor even did not attempt. The utter absurdity of the *Tribune's* representations, and the indecency of its grasp after favor and capital, simply disgusted iron-masters, and thus embarrassed the development of Dr. FIELD's process. It was, however, thoroughly and faithfully tried at last by the inventor himself, aided by all the skill and facilities of two of our largest iron-works, and although it had some little merit, it was of insufficient value to warrant its adoption at either of these works. In common with numerous kindred inventions—a mere flux to remove some of the impurities from iron—it has already sunk out of sight as an invention of limited utility and importance. The *Tribune* has now fastened itself around the neck of another discovery of some promise—the use of the Codorus ore, found in Pennsylvania, in purifying iron. In its own convincing manner, it bids for the favorable consideration of the iron trade, by asserting that the standard processes are now to "superseded." No modern iron or steel process has been superseded, heretofore, by a new discovery; they have modified and improved each other. Blooming, puddling, cementation, crucible-melting, Bessemerizing, and the Siemens-Martin and all other established processes, instead of displacing each other, are all increasing and growing up together. In many cases the new processes enlarge the field of the older ones, and in no case has any process reached perfection; but all of them are the constant subjects of experimental improvement. This being the general law of the development of iron metallurgy, the authority quoted attempts to establish its latest speculation by promising that the general law shall now be reversed. The standard process, yet in its youth, is to be entirely wiped out by one in its infancy—by a process which, although barely developed in one town, is subject to no difficulties of varying materials and skill, but produces "a perfect steel, with no risk of failure." The good-will and confidence of manufacturers thus being secured, our contemporary proceeds to give metallurgists some information, of which one sample, we think, will answer every purpose. A perfect steel, it says, is "produced by the ordinary puddling process"—which is simply a physical impossibility. The puddling process decarburizes melted pig-iron, and reduces it to a pasty ball of malleable iron. Certain grades of puddled iron are sometimes called "puddled steel" or "semi-steel," but the term "steel" is universally held to apply only to a malleable product that has been cast from a liquid state, and is hence, in character and structure, essentially different from any possible product of the puddling process. Such being the actual state of the art, the *Tribune* assures railroad men and metallurgists that it is a simple process, "with which they are perfectly familiar." And, finally, in order that no single feature of the discovery may escape its handling, the *Tribune* recommends the new steel for rails, on the ground that "Col. BOYER, of Pottsville, who has no interest in this discovery, and never visited the mines till Monday," finds it to be an excellent "tool" steel. In every other rail process, the chief effort is to make the metal as unlike tool steel as possible, but then the idea of tool-steel rails is not very startling when once we have familiarized ourselves with puddling cast-steel, increasing the strength of cast-iron fivefold by a flux, and the general upsetting of our previously-acquired knowledge and devices. Seriously, American industry should be protected against the clumsy caresses of its friends.—*N. Y. Times.*

THE ENGINEERING AND MINING JOURNAL.

CONTENTS FOR THIS WEEK.

[*Illustrated Articles are marked with an asterisk.**]

*Driving-Wheel Lathes..... 161
Method of Testing Portland Cement..... 161
On the Preparation of Specimens of Soundings for the Microscope..... 162
On Proposed Improvements for Common Roads..... 162
On the duty of Cornish and other Pumping Engines for Draining Mines..... 163
Nevada Silver Mines..... 163
MINING SUMMARY..... 164
ON-DIT ABOUT MINES AND METALS 165
SPECIAL SCIENTIFIC BREVITIES.. 165
MARKET REVIEW..... 166
The Slate and Marble Interests of Vermont..... 167
The Discovery and Production of Gold in California..... 168
Land Office Fees for Mining Claims..... 168
Wanted, Protection against Industrial Quackery..... 168
EDITORIALS:
The Mitrailleuse..... 169
The Copper Deposits of the Permian Formation..... 169
New Publications..... 169
The Fair of the American Institute..... 169
The Chemistry of the Bessemer Process..... 169
A New Furnace for Roasting Pyrites..... 169
The Chemistry of the Bessemer Process..... 170
OFFICIAL LIST OF PATENTS..... 171
MISCELLANEA..... 172
ADVERTISEMENTS..... 173

ROSSITER W. RAYMOND, Ph. D., Editor.

PUBLISHERS' ANNOUNCEMENT.

THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.*

SUBSCRIPTION—**$4** *per annum in advance;* **$2 25** *or Six Months.*

ADVERTISEMENTS.—*The rates are as follows: Inside pages,* **35** *cents per line each insertion; the outside or last page,* **40** *cents per line. Payment required in advance.*

NEWS-DEALERS *will be supplied through the agency of the* AMERICAN NEWS COMPANY, *No.* 121 *Nassau street, New York City.*

COMMUNICATIONS *of all kinds should be addressed to the Publishers. The safest method of transmitting moneys is by checks, or Post-office orders, made payable to their order.*

Correspondence and general communications of a character suited to the objects of THE ENGINEERING AND MINING JOURNAL *will always be welcome.*

The Postage on THE ENGINEERING AND MINING JOURNAL *is twelve cents a year, payable quarterly, in advance, at the office where received.*

GEO. E CUMMINGS *is our Agent at Philadelphia. Office, 429 Chestnut street.*

WESTERN & COMPANY,
Publishers,
37 PARK ROW,
P. O. Box, 5969. NEW YORK CITY.

The Mitrailleuse.

WE have not felt called upon to enter the field of Bohemian criticism upon the political and military aspects of the Franco-Prussian war, though it has been difficult for us to abstain from comments concerning the topic which occupied all men's minds. As the end approaches, and the smoke of battle ceases to obscure so thickly the actual relations of events, we take occasion to seize upon certain features of this gigantic struggle bearing upon our own sphere as journalists of engineering science.

It is already clear that the *mitrailleuse*, rejected or contemned by military engineers before the war, has established itself amid the carnage of a dozen fields as one of the most effective weapons of modern military art.

The mitrailleuse differs considerably from the GATLING gun—to which, indeed, we think it in some respects inferior; but the tactical object of both is the same, namely, to pour *mitrail*—that is, a hail of small missiles—into the ranks of an enemy at short range. This arm is therefore to be compared with ordinary field-pieces, firing grape and canister. American artillerists have hitherto inclined to prefer the latter. It seems, indeed, that a gun which can fire, when desired, solid shot or shell, and then, at close quarters, deliver its devastating charges of canister or grape, would be more effective on the whole than one which amounts to little more than a bundle of rifle-barrels, all fired at once.

The simultaneous discharge of all the barrels of the mitrailleuse is also held to be a disadvantage, as causing excessive recoil. A rapid succession of discharge, like that of the GATLING gun, would, it is said, secure equal effect with less recoil.

But whatever be the drawbacks of the mitrailleuse, its tremendous efficiency is proved. It is efficient at times when all other artillery is useless. It fills a vacancy heretofore unoccupied in the dreadful lists of the instruments of war. It was said to be specially adapted for certain rare uses only, such as suppressing a street mob; but it now appears that the occasion for the mitrailleuse is one that occurs on almost every battle-field. Its rattling roar has been heard from Weissenburg to Sedan.

The following quotation from an account of the battle of Gravelotte, published in the New York *Tribune*, illustrates with terrible force the truth of this statement:

"Now began the grand attack on the French position. A tremendous fire of artillery from 120 pieces was kept up all along the line on the French works; and after about half an hour's shelling, the 33d Prussian regiment dashed up the hill. When they got half way up, the mitrailleuses opened on them, and did terrible execution at close quarters. The men, however, pressed on, though they fell literally by hundreds; they actually got on the works, and a half battery of 4-pounders, which had followed them, got more than half way up the hill. But the French ran their mitrailleuses 400 yards further back before they could be caught, and from them and their guns, which had been drawn back a couple of hours before, opened so deadly a fire that the 33d was compelled to retire down the hill. The ten French mitrailleuses were dragged forward again, and poured a terrible fire into the retreating infantry. The half battery endeavored to return their fire, but it was silenced, and all the horses being either killed or wounded, the guns had to be left on the hill side. Of course, their breech-pieces were withdrawn, so that they were useless to the French, who, besides, did not dare venture to take them, the Prussian tirailleur fire being far too severe. Then an attempt was made to charge the hill with cavalry, the cuirassiers and uhlans dashing up the road at the batteries, but men and horses rolled over in the hollow road, and they were compelled in turn to retire. Then another infantry regiment, the 67th of the line, tried the attack, but on a different principle—this is, in skirmishing order, instead of in column. Their men crept from bush to bush, and from rock to rock, taking advantage of the slightest inequality of ground to shelter themselves. Another attack was then tried up the road, covered by a tremendous artillery fire; but though the men again got to the French works, they were again shot down in such numbers that they could not hold their ground. In fact, no living being could exist on the road."

The sudden retreat of the mitrailleuses, above described, would not have been possible with field artillery. Nothing is more common in battle than to charge upon batteries of artillery and capture them. Nothing is more certain than that the charging column, whether of horse or foot, if it is not overcome by the last discharge of the enemy's guns, will certainly get possession of them. There is in ordinary tactics but one choice. Either the batteries must be limbered up and withdrawn in time, thus foregoing their destructive effect at the most critical moment, or, in order to obtain that effect, the batteries themselves must be risked. If the advance of the enemy is repulsed or checked, the guns can be brought off in safety; but if the works are entered, horses and men sabred or shot down, the guns are lost, and with them the position, unless it is otherwise commanded. The cavalry at Balaklava, in its vain charge, captured the batteries which it could not hold.

But at Gravelotte, as we have seen, the mitrailleuses remained in the line after the artillery had retired. They dealt destruction upon the enemy to the last, and were then wheeled back by the retiring French, to open their fire anew, and drive the victors from their dear-won position. Last in the retreat, the "infernal wheelbarrow" was also foremost in the pursuit, and completed the repulse of the Prussian columns.

It is not surprising, in view of such reports of these, that Russia, England, and other powers, are hurrying to adopt an apparatus at once so efficient and so portable.

The introduction and the effective handling of the *mitrailleuse* is almost the only creditable feature of French tactics in the present war. The Chassepot appears to be in itself difficult to handle, and to have been unskillfully handled besides; the peculiar tactics of the Turcos and Zouaves break down when opposed to the steady valor of the German troops; the organization of the French staff has proved as miserably deficient as the disipline of the troops: even the French artillery, famous since the Italian war, is said to have been badly served; while the strategy of the French generals has disgraced and ruined their armies. The gallant and desperate bravery of the French soldier has had but one thoroughly successful ally—one support which has proved to be all that it claimed to be—and that is the *mitrailleuse*.

The Copper Deposits of the Permian Formation.

SEVERAL times within the past two or three months we have made allusion to the copper deposits of Texas, which, as we have already stated, occur in the Permian formation, and we have also mentioned their analogy with the extensive deposits of the Mansfeld district, in Prussia. Our attention has, however, been again directed to the subject by Mr. MEZGER, an engineer of liberal acquirements and extended observation. For several years he was the superintendent of the copper smelting works at Wosskressensk, in the Ural Mountains, in Russia, so that, of course, he is perfectly familiar with the ores of that section. He has also seen numerous specimens of the Wichita county ore, at Corpus Christi, Texas. In the Ural, it was supposed that ores found there were exceptional, and peculiar to the locality. They are, however, identical with those recently found in Texas, both in their chemical composition and in the fact that both occur pseudomorphic after wood. In 1867 an engineer who had visited the province of Angola, in Africa, returned and brought with him specimens of copper ore found there in the Permian formation. A careful examination by the celebrated mineralogists of Freiberg showed them to be also precisely the same as those from the Ural. They were also pseudomorphous of wood structure. Mansfeld in Prussia forms no exception to the general rule of finding the copper ore of the Permian formation in connection with organic forms, though there fish instead of wood have been petrified, and are frequently found in the copper-bearing slate. Specimens of wood which had been converted into flint were also frequently found in Russia, and these, as well as those which had been converted into copper-glance, were positively determined as belonging to the botanic family *Araucaria*.

The surface of the specimens from all the localities mentioned was partially covered with malachite and azurite, while in the small cavities contained in them are found crystals of heavy-spar or barite. Another class of ore worked in the Ural is of slaty structure, containing only traces of organic remains, while it is mainly composed of copper-glance with quite a large percentage of malachite, containing on an average from 12 to 18 per cent. of copper. One of the largest copper-works of the Ural is called, from the name of the proprietor, the Pachkoff Works. The copper from these works is celebrated, and commands a very high price on account of its exceeding purity, softness and ductility.

It is a remarkable geological fact that the Permian formation, in three parts of the world so remote from one another, should in every case show just the same features. The distance from the Ural to the Wichita river is 154 degrees of longitude and 18° of latitude, and a difference of ten hours and sixteen minutes in time; from the Ural to Angola 50 degrees in longitude and 60 degrees in latitude, while from Texas to Angola we have a difference of 110 degrees longitude and 44 degrees latitude. Since writing the above we have learned from Prof. PECK, of Columbia College, that a dozen years ago, when in the U. S. Engineers, he made a topographical survey of Texas, and in a locality a few miles northwest of Wichita county, on the Red River, he found an immense number of specimens of agate, showing plainly the structure of the original wood. One of these specimens, which he broke from a tree as large in diameter as a man's body, is still in his possession. This gives us another remarkable analogy with the same formation in the Ural.

While the strata of most other formations can only with difficulty be identified with similar strata in other localities, the Permian would seem to furnish us an infallible guide for exact identification, in its peculiar copper-deposits.

New Publications.

ELEMENTARY TREATISE ON MECHANICS: For the Use of Colleges and Schools of Science. By WILLIAM G. PECK, LL.D., Professor of Mathematics and Astronomy in Columbia College, and Mechanics in the School of Mines. A. S. BARNES & Co., New York and Chicago. 1870.—This volume, of three hundred pages is gotten up in the usual style of the text-books published by this firm. The book has for its foundation the former edition of "Peck's Mechanics," but has been entirely revised and rewritten by the author. Demonstrations involving the use of the calculus have been either omitted or demonstrated by the well-known methods of lower mathematics, rendering the book comprehensible to any one of a fair mathematical education. When we consider the vast number of mechanics who daily work on a rule derived from mathematical science, without the least knowledge of the process from which the rule was derived, we think that a book of this kind, demonstrating all the ordinary principles involved in a simple manner, cannot fail of accomplishing much good in the diffusion of useful information.

In some books of this practical nature we often find that one or more of the vitally important principles have been omitted, but in this case we fail to find even the slightest dereliction of this nature, and all the demonstrations are clear and succinct; nothing is introduced which does not tend to the solution of the problem, and every part is found to be logically correct. On the other hand, it is clearly stated in the preface that the book is, as its name indicates, an elementary one, and not an exhaustive work on the subject. Numerous examples of a practical nature are introduced under the proper heads, and will be found of more than ordinary interest. The wood-cuts with which the book is illustrated are certainly not very fine or handsome, but they are sufficiently clear and good for all practical purposes.

The Fair of the American Institute.

THIS great annual exhibition, which has become a recognized institution of New York, and indeed of the country, began last week. The opening exercises consisted of a few remarks by the Hon. ORESTES CLEVELAND, Chairman of the Board of Managers, who called the meeting to order, and introduced the President of the Institute, the Hon. HORACE GREELEY.

Mr. GREELEY's remarks were mainly confined to the subject of protection for American industry. Iron and steel served, as usual, as the chief examples.

He was followed by Dr. GEORGE B. LORING, of Salem, Mass., who delivered a more extended address, in which he first alluded to the intellectual acquirements of such men as HAWTHORNE, EMERSON and BRYANT, then in rather a novel and pleasing way introduced the subject of American art, and closed with a somewhat extended review of the growth and present condition of American industry. Many of the articles intended for exhibition are not yet in place, and were not yet on the ground, so that it is as yet impossible to give a fair description of the scene at the Rink, as it will undoubtedly appear in a few days, when it reaches its full splendor. The fair is to continue until Nov. 2d, and promises to divide the attention of our people with the European war and the fall of the Napoleonic dynasty.

The Chemistry of the Bessemer Process.

WE publish this week the conclusion of the paper by Lieut. C. E. DUTTON, Ordnance Corps, U. S. A., read before the American Association at its Troy meeting. The first instalment of this able essay appeared accidentally without the author's name, though credit was given in an editorial correspondence. Lieut. DUTTON is evidently a clear thinker and a forcible writer; and we are glad that he does not, like too many accomplished officers in his corps, content himself with the easy peace-duties of his profession, but employs his abilities and leisure moments in cognate scientific pursuits.

A New Furnace for Roasting Iron Pyrites.

A NEW invention for this purpose is thus described in the *Colliery Guardian*: "In roasting iron pyrites for the production of sulphuric acid, the combustion of the waste or dust from the beating in pieces of the iron pyrites is not completely effected. If this dust is formed with clay into small balls and roasted, or if the greuts are charged with the pieces, the waste is consumed, but with great loss of the sulphur contained in the ores. The small greuts obstruct or fill the canals formed between the pieces of ore, impede the draught, and cause bad roasting; on the other hand, they fall through the grate if the ore is moved during charging, and form sulphurous residues. The same difficulty arises if the small balls formed of pyrite powder and clay contain such impurities as blend or heavy spathe, which cause the production of powder. Besides this, the residue are, in the most favorable case, insufficiently roasted. Moreover, the roasting of blend has not succeeded in such a manner that the escape of large masses of sulphurous acid into the open air could be prevented. Although the furnace known as the "Gerstenhofer" furnace in roasting blends delivers such gaseous products which are fitted for the production of sulphurous acid, the disulphuration of the ores is, notwithstanding,

very incomplete, and the ores leave the furnace with half the amount of sulphur which they contained before roasting, and therefore, a second roasting in the ordinary puddling furnace is necessary. This inconvenience it is proposed to avoid by means of a new apparatus for roasting iron pyrites, which is thus described: It can be connected with a suitable furnace; it has a series of plates one below the other; the dry ore is supplied through a hopper, and passes from one plate to the other down the series. In every story or floor the ore forms an angle of about thirty-three degrees, and rests in its place if the furnace is filled. As the ore is carried away at the bottom it passes or runs from the hopper to the plate, and by the uniform motion during its passage down it continually presents fresh surfaces. The angle which the plate forms with the horizon can be varied; the smaller it is the thinner will be the layer or stratum of ore, and the more complete will be the mixing and roasting. The space below the plates and above the ores serves as a canal for the gaseous products of the roasting. The ore may be roasted in a muffle which is surrounded by the fiery gases of the grate, or the ore may be roasted by the escaping gases of the pyrite furnace. In the two cases the gases pass upward and enter at last a cylinder, through which they are conducted into the heat chamber. This new roasting device differs essentially from that of "Gerstenhofer," above mentioned, as the ore is not roasted in the free fall, but upon a surface as in an ordinary puddling furnace. It also allows the roasting of the greuts, which is not the case in the furnace of "Gerstenhofer." In the same manner this arrangement differs from the so-called story furnace of the Pereire, as in that furnace the workman has to push the ore from one story to the other, and during this operation the doors are opened and permit a very disagreeable escape of sulphurous acid. The invention has been patented.

The Chemistry of the Bessemer Process.

[Read before the Troy Meeting of the Association for the Advancement of Science.]

By Lieutenant DUTTON.

[Conclusion.]

Of equal importance and absolute necessity, is the absence of phosphorus. This element is the arch-enemy of the iron-maker, but it is the very scourge and pestilence of the steel-maker. I venture to assert that the most formidable problem which has arisen with respect to any process dealing with iron or steel, is the phosphorus problem in the Bessemer converter. A few pounds of phosphorus in a ton of Bessemer railway bars renders them unfit even for the scrap heap. Fifteen-hundredths of one per cent. of it is sufficient to render common wrought-iron worthless, but one-tenth of that quantity will ruin Bessemer metal past all remedy. But the smallness of the quantity which is capable of working this terrible destruction, is by no means the worst evil. There are two other circumstances of an appalling nature, viz.: the almost universal presence of phosphorus, and the absolute impossibility of eradicating it by any process at present known. "Chemical geologists" have very generally concluded that iron ores, with a few inconsiderable exceptions, are deposits effected by organic agency, of which the formation of bog ore, lake ore, or linomite is a fair sample, and that the present conditions, as magnetites, hematites or spathic ores, are the results of metamorphic action—the most highly metamorphic form being the magnetic oxide. The manner in which beds of different oxides are found to be related to each other, tends strongly to this conclusion. For it is well-known that phosphorus is an essential element to the growth of most organisms, and we must therefore anticipate that wherever organic life has wrought, upon a large scale, we shall find all the elements involved accumulate in its deposits. Hence it comes to pass that phosphorus is almost universally present in iron ore, in coal, and in those limestones which have been accumulated by the accretion of the skeletons and rests of animals. Owing to the enormous affinity of iron for phosphorus, all of the latter element contained in the fluxes, the fuel or the ore, is concentrated by the blast furnace process directly into the pig metal, as phosphide of iron. I have already ventured the opinion that phosphorus increases its affinity for iron with every increase of heat; at least relatively, if not absolutely. This fact seems to be absolute. If we accept it, we can instantly explain what seems, otherwise, to be many anomalies and contradictions. It will explain to us why, in the great heat of the blast furnace, it leaves every other combination, and enters the iron; why, in the much lower heat of the puddling furnace, it seems to waver between staying with the iron, or forming a new alliance with oxygen, ready to choose either, at the influence of any third substance which may affect the question; why, in the Bessemer process, it clings to the iron with a desperate tenacity which nothing seems able to resolve. These three facts, then, are all of them formidable. 1st. That a minute quantity of phosphorus is capable of working terrible injury, and that it is omnipresent throughout nature. 2nd. That whatever quantities of it are charged into the blast furnace, as fuel, flux, or ore, are almost wholly concentrated into the resulting pig iron; and 3rd. That no portion is eliminated in the Bessemer converter. How then can we hope to make a metal which is good for anything.

Fortunately for our purpose, there are ores, fluxes and fuels, which contain only extremely minute proportions of phosphorus, though I doubt whether there be any such materials absolutely free from it. But there are found those which are sufficiently so for all practical purposes. There is a limit below which even phosphorus ceases to be injurious to the metal, and hence we have no present alternative but to select those materials containing quantities of it within their limit. These furnace materials are somewhat rare, and confined to a few favorable localities, but their existence has been demonstrated fully in Europe, and I am sanguine that they can be found—nay, they are already found in the United States.

You will perceive then the force of the remark, that the question of the practicability of making Bessemer metal resolves itself, first and foremost, into the question of the practicability of making a suitable pig-iron for it. To settle this we must go back to the blast furnace, and even back of that, to the ore beds themselves; and hence it will not be going beyond the limits of our subject to discuss some features of this antecedent question. The Bessemer process will be seen to mean, not merely circumstances attending the forcing of air through a bath of molten metal, but the selection of suitable materials, and smelting them in the blast furnace. But before doing this let us continue the discussion of these reactions, and get them out of the way, in the hope, that from the end of the process we may, by looking backwards, determine intelligently what materials we are to look for, and how we are to treat them.

One more point with reference to the behavior of phosphorus. I have maintained that its failure to be removed is due to its originally powerful affinity for iron, which is strengthened by the enormous heat of the pneumatic process. But iron is not the only metal for which its affinity is very great. The metallic bases, sodium and potassium, oxidized to soda or potassa, have great affinity for acids. They readily form silicates, and still more readily, phosphates. Traces of these elements are frequently found in pig-irons, and notably so in the charcoal irons. They reappear too in the slags derived from converting charcoal irons in the puddling furnace They are unquestionably derived from the ash of the charcoal, which contains them in notable quantities, and these facts have led to the conjecture, frequently expressed by metallurgists, that the superior qualities of charcoal irons are due to these bases, which take up both phosphorus and sulphur, as well as other noxious impurities, in the form of acids. The well-known affinities of these bases for phosphoric acid led GIRARD to believe, that by introducing the vapor of sodium into the iron previous to its treatment in the converter, phosphate of soda or potassa might be formed, and phosphorus thus eliminated. This conjecture is by no means impossible, though it holds out very little hope of practicability, since it would, of necessity, be an expensive resource. It is merely mentioned as indicating a possible direction, towards which we may perhaps sometime turn for assistance.

Manganese, which is so beneficial in the puddling process, has both advantages and disadvantages in the Bessemer. I do not refer, here, to the manganese contained in the spiegeleisen, which is another matter, but to the manganese sometimes contained in the convertible metal. An excessive quantity, while forming an excellent slag, economizing iron, and removing sulphur, will deteriorate the quality of the steel itself, and sometimes interferes with the regularity of the process. From one to one and a half per cent. is, on the whole, very beneficial. It is powerfully oxidized in the first stages of the conversion, and replaces iron in the slag, rendering the slag very liquid and fusible.

With respect to sulphur, the reactions in the Bessemer converter do not differ from those of the puddling furnace. It is removed chiefly about the middle of the heat. Although no careful and systematic analyses of the slag have yet been made, it is probable that sulphide of iron will be found there in small quantities, provided the pig metal contain it to the extent of two or three per cent. It is by all means desirable that the pig should be as free from sulphur as from phosphorus. Its effects are always deleterious, although it requires a larger amount of sulphur than of phosphorus to cause an equal amount of damage. Like phosphorus, too, it is one of the universally-diffused elements, accumulated by organic agency, and much more abundantly in fuel than in ores. But sulphur is, on the whole, not a very formidable difficulty, because it can be sufficiently removed from most irons. A small quantity of manganese is its best antidote, with which it readily combines as a sulphide, with a stronger affinity than for iron. The oxidation of the carbon is the final reaction of the blast. It begins before the silicon is removed, and continues with increasing vehemence until two-thirds or three-fourths of the time has elapsed, when it begins to show signs of exhaustion. The product is carbonic oxide, with possibly a slight admixture of carbonic acid. The silicon stage very considerably overlaps the carbon stage—indeed, when the percentage of silicon is very high, it continues to oxidize in decreasing quantity to the end.

The moment for terminating the blast is indicated, usually, with extreme promptness. The flame from the mouth of the converter is the outward sign of what transpires within, and to the accustomed eye, and even the accustomed ear, it may be said, gives unerring indications of its progress and completion. It begins very tamely by the emission of a thin, transparent, and not very intense luminosity, showing that very few volatile matters come out. Indeed, the oxidation being at first confined to iron and silicon, which are non-volatile, it is precisely what would be expected. But when the carbon begins to burn, as it does very gradually, the flame becomes by degrees more brilliant, whiter, denser, longer, and more voluminous, passing from orange or yellowish-white to nearly pure white, and ultimately to violet white. Near the end it grows somewhat paler, and somewhat less voluminous, until the theoretical moment is reached. Then, with great suddenness, a marked change takes place. The flame becomes instantly smaller, and clearly transparent—indeed, somewhat hollow and ghostly, accompanied with a smoke, which, except in special cases, was not before very perceptible. The great feature, however, is the suddenness of the change. Some idea of its rapid character may be gained, when it is stated that the practiced—and not very highly practiced—observer can discern it in the night time at a long distance from the foundry, and in any position where he can command view of the tall chimney, or even of the glare from the doorways—no direct view of the flame being necessary.

What is most remarkable is, that this change takes place before the carbon is perfectly removed. There is still left in the bath a minute quantity of it, which seems to decline further oxidation. It is exceedingly small, indeed not more than five or eight hundredths per cent., and sometimes is considerably less. Now it is generally supposed that the flame owes its intensity to the combustion of the carbonic oxide, and the presence of other matters included in it. Moreover, the oxidation and removal is a gradual one, and what possible cause can we assign for this almost instantaneous change? If the blast be continued after it, its effect is merely to oxidize the iron and not the small residues of impurities. Indeed, none of the impurities are removed perfectly, but seem to resolve themselves slowly, and with decreasing rapidity, until a certain point of attenuation is reached, when further resolution is overpowered by a direct oxidation of the iron. Now, why should their removal be suddenly chopped off short in this way, or at a point of decarburization which is nearly, but not quite, perfected? The explanation of this, which I suggest, I have not had time to consider fully, but at present it seems to me to approximate to correctness, though I do not offer it with the fullest confidence. You will be best able to comprehend it by a blackboard illustration. [The speaker here illustrated the intensities of the reactions and their succession by two co-ordinate axes and curved lines referring to them.]

A plausible explanation is this: When two combustibles are intermixed, like oxygen and hydrogen, or hydrocarbon gas, it is well known that the relative proportion of the two elements in the mixture influences the readiness with which they combine. Thus oxygen and hydrogen cannot combine explosively, unless their proportions lie within certain definite and rather narrow limits. May not the same law hold good in the present case? It is certain, or nearly certain, that the iron either does not oxidize in the bath during the blow, except in quantity sufficient to furnish a base for the acids present, or, if it oxidizes beyond that, it is immediately reduced again, leaving little or no free oxide of iron in the bath. But after the change of flame all this is reversed, and iron oxidizes rapidly and freely, and remains undecomposed, while the residual traces of the other elements as suddenly cease to oxidize rapidly. I freely grant that in referring this back to what is supposed to be a conceded, but unexplained law, we are merely putting the question in another, a more general, and more abstract shape; still it is, in a qualified sense, an explanation.

At the termination of the blow we have wrought-iron in a thinly fluid condition, and though still retaining traces of impurities, yet much more free from them than the iron obtained by puddling. Now it is popularly understood that the Bessemer process is a process for making steel; and the term steel is almost always used after the adjective Bessemer, in speaking of the resulting metal. After considering the matter fully, I do not hesitate to say that the term steel, as applied to any Bessemer metal produced in this country, is an entire misnomer, as you yourselves will soon be able to decide. It is true, wrought-iron, possesses, however, in an incipient degree, (and a very small degree,) the properties of steel. But let us first complete the process.

After the iron is blown it is covered by a slag, which, on account of the large amount of silicon eliminated, contains much oxide of iron. There is also some free oxide of iron in the bath, which is produced because some seconds generally or always elapse between the change of flame and the stoppage of the blast, and in that interval enough of oxide of iron is formed to injure the quality of the metal. Again, some free atmospheric oxygen is also contained in small bubbles in the bath, which would give rise to small flaws in subsequent working. Finally the sulphur, if any considerable quantity existed in the pig, is insufficiently removed by oxidation. In making railway iron it is also necessary to add a small quantity of carbon, in order to render the metal harder than the almost pure iron yielded by the blast. In a word, the metal needs a treatment which shall remove oxygen and add carbon. This is effected by introducing into the converter a small quantity of melted cast iron of a peculiar constitution. The deoxidization is best effected by manganese, since it will instantly absorb free oxygen and decompose oxide of iron. The oxide of manganese thus formed will immediately decompose the silicate of iron, which is the slag, eliminating part of the iron in the metallic state, and forming silicate of manganese. There is also no danger of the manganese alloying with iron, or mingling with it to any injurious extent. It also tends to eliminate still further any sulphur which may still remain. The whole range of chemical technology does not furnish a more perfect specifi for any purpose than manganese at this stage of the process. The peculiar form of pig-iron known as spiegeleisen contains from four per cent. upwards of manganese. It is a property, too, of all spiegeleisens, that they contain the highest percentages of carbon, and hence it is the very metal we are in quest of as a deoxidizer and a re-carburizer. The higher the percentage of manganese, the better; because it enables us to employ smaller quantities of it, and thus partially avoid introducing silicon, sulphur and other deleterious matters, always contained in spiegeleisen more largely even than in common cast-iron. The quantity of spiegel turned into the converter for ordinary railway bars is, at Troy, five or six per cent. of the main charge. This contains five per cent. of carbon, and thence the amount of carbon added is from twenty-five to thirty-hundredths of one per cent. But of this carbon a portion is oxidized by the oxide of iron in the bath, so that the whole amount remaining does not exceed twenty-hundredths of one per cent. This amount of added carbon is not sufficient to constitute steel, in the ordinary acceptation of the term, although it is sufficient to develop to some extent the steel properties. Indeed, for railway purposes a true steel is wholly indesirable. Those who are acquainted with properties of chalybeate metals, in their relations to the arts, will bear out

the assertion that a genuine steel is totally unfit for any such purpose. There is a vast amount of popular ignorance and misapprehension on this subject, not a little so-called expert, and even some scientific misunderstanding. It is generally believed that genuine steel is the best possible metal to resist stresses of all kinds, and that the Bessemer process yields very bad steel. But in fact steel is wholly unsuited for many kinds of stress; the Bessemer process, as practiced in this country, does not yield a steel at all, and the metal which it does yield is not bad, but of the highest excellence. Now let us briefly scan this matter, and see if, in all reason and in fact, it be not strictly true. I have labored throughout this paper to show you that the differences between the puddling and Bessemer processes are not very—indeed are only slightly—different in their chemical relations; but that they are widely asunder in their mechanical elements. When wrought-iron comes to mature in the puddling furnace it aggregates into a sponge, or loosely conglomerated granules of iron, without any special arrangement, and including in its porosities considerable scoriaceous slag, which is partially expressed by powerful squeezing. But every atom and every lump of iron is bathed in this slag, which cannot be all removed, and the utmost that the squeezing can do is to remove a part, and force only a portion of the particles into strict mechanical contact. But even the metal itself is not thoroughly homogeneous, and cannot be homogeneous with such a clumsy method of working as is now followed by stirring with a rabble. The bar or billet made from the puddle ball is cut, in subsequent processes, into numerous pieces, which are piled and welded together by rolling. Now what is the result? Even in the best iron the finished product is a mass of welds, united as best they can be, but still welded together, with all the uncertainties and imperfections which necessarily attend welding. Now it is clear (I quote the language of Mr. BESSEMER) "that iron in its ordinary malleable state presents an unfavorable contrast to the other malleable metal; for they are known not to possess the inequalities found in iron; they are free from sand and scorid, and have no hard and soft parts, nor do they require any welding of contiguous surfaces, but are perfectly homogeneous and free from all mechanical admixtures with foreign substances. To what, then, do gold, silver, copper, zinc, tin and lead owe this valuable exemption from the defects universally found in puddled iron? The answer is found in the simple fact that all these metals are purified and refined in a fluid state, and while still fluid they are formed into ingots." By this process any impurities float on the surface of the metal, and are effectually separated from it. And this is just what the Bessemer process accomplishes for wrought-iron. It makes a perfectly homogeneous metal, free from included slag, and all its particles in thorough contact. The gist of the whole process is, that it enables us to make a cast wrought-iron.

"The ingot, of whatever metal it is formed, crystallizes in cooling, in a manner peculiar to itself, all cast ingots being of crystalline structure." This crystalline property, by many observers, has been seized upon and declared to be an inherent qice. It is the strangest thing possible that it has not also been noted that the same property is chargeable in ten-fold degree upon puddled iron. It would be impossible to illustrate this any better than by mentioning an experiment made over a year ago at Fort Monroe. It was a trial of a fifteen inch gun and twelve inch rifle against an iron and granite target. In constructing the target there were used wrought-iron stanchions, supporting the framework to which the plating was bolted. They were of enormous size, (12×15) and at the first impact one of them broke across, like glass. When the surfaces of fracture were exposed they caused an exclamation of wonder from every expert and manufacture who saw them. It seemed as if the mass were composed of large crystals—larger, indeed, than those of any cast-iron, except spiegel, and of brilliant lustre. Thinking that it might be due to the suddenness of the impact, two of these beams were broken in a hydrostatic press, and showed about the same state of affairs. Somebody suggested that they were badly made, but they were manufactured out of the best charcoal pig, from Lake Superior ores, the best iron to be had for the purpose, by the Sligo Iron Company, whose iron commands in the market a higher price than any brand in the civilized world. It was finally suggested to be an anomaly but the upshot of it was they came to the conclusion that pretty nearly all large forgings exhibited the same phenomena, and the mystery is that so obvious a fact, so thoroughly established, and so well-known to Bessemer men, had ever failed of recognition. And yet this crystalline property does not lessen ductility in any degree whatever, as has been proven over and oven again, both in Bessemer and puddled metal. The contrary notion is a mere tradition and a prejudice, which none but true experts ever conquer. Why then should it be urged that the only way to make iron is to stick dirty granules of it imperfectly together, and squeeze the mass until it is almost useless, until it is again fagotted together, and again united imperfectly, and thus forever repeat injuries and defects entailed by the first process; when it may be cast into a ductile homogeneous ingot and forged into any size or shape at will.

I regret that I am obliged to leave the subject here with many important features untouched. But these may well form separate theses by themselves, though they form together a united branch of technology which is one and indivisible in reality. Let me close, therefore, with a definition of my theme that the Bessemer process is a method of making cast wrought-iron.

Coating Copper and Brass with Zinc.—According to BOTTGER, copper and brass can be easily coated with zinc by immersing them in a boiling bath of salammoniac containing zinc foil or powder. The deposit of zinc made in this way is brilliant, and adheres firmly to the copper and brass. Whether iron could be coated or galvanized in the same way is not stated by the author, though salammoniac in the ordinary process is well understood.

OFFICIAL LIST OF PATENTS.

Issued by the United States Patent Office.

FOR THE WEEK ENDING SEPTEMBER 7, 1870.

Reported Officially for the Engineering and Mining Journal.

SCHEDULE OF PATENT OFFICE FEES

On each caveat	$10
On filing each application for a Patent (seventeen years)	15
On issuing each original Patent	20
On appeal to Commissioner of Patents	20
On application for Reissue	30
On application for Extension of Patent	50
On granting the Extension	50
On filing a Disclaimer	10
On an application for Design (three and a half years)	10
On an application for Design (seven years)	10
On an application for Design (fourteen years)	30

Citizens of Canada can now obtain Patents in the United States upon the same terms as Citizens of other Countries.

For copy of Claim of any Patent issued within 30 years	$1
A sketch from the model or drawing, relating to such portion of a machine as the Claim covers, from upward, but usually at the price above named	$1
The full Specifications of any patent issued since Nov. 20, 1866, at which time the Patent Office commenced printing them	$1 25

Official Copies of Drawings of any patent issued since 1836, we can supply at a reasonable cost, the price depending upon the amount of labor involved and the number of views.

Full information, as to price of drawings, in each case may be had by addressing

WESTERN & CO.,
No. 37 Park Row, New York.
CHARLES ROGERS, Solicitor.

106,981.—CORN PLANTER.—Michael Ackermann, Steamboat Rock, Iowa.
106,982.—GANG-PLOW.—James H. Andrews, Benicia, Cal.
106,983.—EGG-CARRIER.—James R. Asher, Oskaloosa, Iowa, assignor to himself and Robert I. Robeson, same place.
106,984.—DETACHABLE BOOT AND SHOE HEEL.—Charles W. Bailey, Boston, Mass.
106,985.—FIRE-PLACE.—Thomas W. Baird, Bowling Green, Ky.
106,986, antedated August 25, 1870.—MOP.—Charles L. W. Baker, Hartford, Conn.
106,987.—FOUNTAIN PEN.—Gustav A. Becker, Seymour, Conn.
106,988, antedated August 25, 1870.—STAVE-JOINTER.—John B. Bell, Pittsburgh, Pa.
106,989.—WOOD PAVEMENT.—Albert Bettely, Boston, Mass.
106,990.—STREET-LAMP.—Emil Boesch, San Francisco, Cal.
106,991.—TOP FOR SHEET-METAL CANS.—James Britton, Williamsburgh, N. Y., assignor to himself and Garret Brower, same place.
106,992.—ROLLING MILL.—William Brown and David Brown, Smithville, England.
106,993.—PULLEY MECHANISM.—Wm. H. Brown, Bangor, Me.
106,994, antedated August 26, 1870.—GRAIN-SEPARATOR.—John D Brunner and Edwin R. J. Ueberroth, Doylestown, Pa.
106,995.—FLOOD-BRIDGE.—Thos. Alfred Bryan, Baltimore, Md.
106,996.—FRUIT-LADDER.—Corodon S. Cannon and Clinton D. Cannon, Chicago, Ill.
106,997.—BEDSTEAD-FASTENING.—William H. Carter, Candor, N. Y.
106,998.—WHIP-SOCKET.—Edwin Chamberlin, Lansingburg, assignor to himself and John O'Marriam, Troy, N. Y.
106,999.—ADDING-MACHINE.—Gilbert W. Chapin, Brooklyn, N. Y.
107,000, antedated August 25, 1870.—MODE OF FORMING UMBRELLA HANDLES FROM PLASTIC MATERIAL.—Levi Chapman, New York, N. Y.
107,001.—BUTTON HOLE SEWING-MACHINES.—William Chicken, Chelsea, Mass.
107,002.—METHOD OF HANGING GRIND-STONES.—Henry M. Church, Brunswick, N. Y.
107,003.—FRUIT JAR COVER.—Thomas A. Clark and Henry C. Mascroft, Worcester, Mass.
107,004.—HARVESTER-RAKE.—Daniel Clow, Janesville, Wis.
107,005, antedated August 24, 1870.—DEVICE FOR LUBRICATING, COOLING, AND WASHING VERTICAL HAMMER SHAFTS OR STAMPS.—Z. E. Coffin, Newton, Mass.
107,006.—WIRE FOR WIRE GOODS.—Wm. F. Collier, Worcester, Mass.
107,007.—WATER-WHEEL.—Jacob M. Cook, Lake Village, N. H., assignor of one half his right to Benjamin J. Cole, same place.
107,008, antedated July 15, 1870.—RAILWAY CAR-COUPLING.—Rensselaer Cowell, Cleveland, Ohio.
107,009, antedated August 20, 1870.—BUTTON HOLE CUTTER.—David H, Cunningham, Waltham, Mass.
107,010.—MACHINE FOR COVERING CORD.—Thomas N. Dale, Jr., and George Kraink, Paterson, N. J.
107,011.—MAXILLARY COMPRESS.—Cornelius E. Davis, St. Helena, Cal.
107,012.—BEE HIVE.—Enos Davis, Noblesville, Ind.
107,013.—WARDROBE, BEDSTEAD, AND BUREAU.—John Rolph Davis and Frederick Rominger, Bloomfield, Iowa.
107,014.—PADDLE-WEEEL.—David De Haven, New Orleans, La.
107,015.—COOKING TABLE.—Eliza D. Dodge, Worcester, Mass.
107,016.—IMPLEMENT FOR CUTTING THREAD.—Frederick Egge and Robert W. Churchill, Bridgeport, Conn.
107,017.—BRICK-MACHINE.—Josiah S. Elliott, Boston, Mass, assignor to Union Stone Company.
107,018.—HAND-RAKE.—Minot Ellis, Greenfield, Mass.
107,019.—FEEDING MECHANISM FOR SEWING MACHINES.—George A. Fairfield, Hartford, Conn.
107,020.—FENCE.—Edward Fales, Glenwood, Mo.
107,021.—BURGLAR PROOF SAFE.—John Farrel, New York, N. Y.
107,022.—FILLING FOR FIRE-PROOF SAFE.—John Farrel, New York, N. Y.
107,023.—MECHANISM FOR OPENING AND CLOSING SAFE DOORS.—John Farrel, New York, N. Y.
107,024.—MEDICAL COMPOUND FOR THE CURE OF FEVER AND AGUE.—Michele Ferro, Inka, Miss.
107,025.—CORNER-SUPPORT FOR CARRIAGE BOXES AND SEATS.—William Fisher, Marathon, N. Y.
107,026.—LAMP SHADE HOLDER.—John Foller, Washington, D. C.
107,027.—COMPOUND FOR DESTROYING THE ODIUM IN VINES, PLANTS, &c.—Claude Paul Folliett, Amonce, France.
107,028.—ELEVATOR.—Chas. R. Foreman, West Branch, N. Y.
107,029, antedated August 26, 1870.—BALANCING MILLSTONE.—Charles V. Foreman, Mechanicstown, Md.
107,030.—GAME-BOX FOR TEN PINS.—George Benedict Fowler, Brooklyn, N. Y.
107,031.—SELF WINDING COUNTER SPOOL.—William J. Fox, Morrisania, N. Y.
107,032.—ADJUSTABLE DIE FOR BENDING MOLD-BOARD.—Jonathan H. Franklin, Avoca, Wis., assignor to himself and J. P. McCallister, same place.
107,033.—PLOW.—Horatio Gale, Albion, Mich.
107,034.—CAR SPRING.—Perry G. Gardiner, New York, N. Y.
107,035.—CAR SPRING.—Perry G. Gardiner, New York, N. Y.
107,036.—CAR SPRING.—Perry G. Gardiner, New York, N. Y.
107,037.—PLOW.—Robert Gibbs, Brunswick, Mo.
107,038.—HAY-LOADER.—Henry L. Gockley, Jackson, Ill.
107,039.—HARVESTER.—Lewis Hall, Metamora, Ill.
107,040.—GRAIN DUMP.—Wm. M. Hall, Jr., Bloomington, Ill.
107,041, antedated August 27, 1970.—SEWING-MACHINE.—Chas. F. Harlow, Boston, Mass.
107,042.—SAFE CASE FOR BOOKS.—Samuel H. Harris, Chicago, Ill.
107,043.—FRAME OF SAFE CASE FOR PAPERS.—Samuel H. Harris, Chicago, Ill.
107,044.—LUBRICATOR.—Joseph E. Hendrick, Waterbury, Conn., assignor to himself and Philo Brown, same place.
107,045.—MOCCASIN BOOT AND SHOE.—Thomas Hersey, Bangor, Me.
107,046.—PEN FOR RULING-MACHINES.—William O. Hickok, Harrisburgh, Pa.
107,047.—BEE-HIVE.—Joseph M. Hicks, Indianapolis, Ind.
107,048.—SCHOOL-SEAT.—George W. Hildreth, Lockport, N. Y.
107,049.—HOBBY-HORSE.—Christopher Hitzelberger, South Orange, N. J.
107,050.—DOUGH AND CAKE-MIXER.—Thomas Holmes, Williamsburg, N. Y.
107,051.—MACHINE FOR MAKING TUBULAR LIGHTNING-CONDUCTORS.—Benjamin F. Houssel and Simeon O. Thayer, Winona, Minn.
107,052.—SULKY-PLOW.—Benjamin F. Hubbard, Hillsborough, Ill.
107,053.—SEPARATING STONES, &c., FROM CLAY, &c.—David James Hunter, Boston, Mass.
107,054.—TEA-POT OR WATER-HEATER.—Edward Hunter, Norwich, Conn., assignor for one half his right to Henry H. Gallup, same place.
107,055, antedated August 25, 1870.—SLEIGH KNEE.—Obadiah Johnson, Lasselaville, N. Y.
107,056.—SEEDING MACHINE.—J. Herva Jones, Rockford, Ill.
107,057.—HARROW.—William P. Jones, Arcade, N. Y.
107,058.—BALE-TIE.—William A. Jordan, New Orleans, La.
107,059.—PAINT COMPOUND.—William N. Jordan, Cambridge, Mass., assignor to himself, Porter M. Smart, and Henry W. Cook.
107,060.—GARDEN HOE.—Alonzo C. Judson, Grand Rapids, Ohio.
107,061.—CAN OPENER.—Joseph Kauffman, New York, N. Y.
107,062.—PISTON-PACKING.—John Keesey, Chester, Pa.
107,063.—PLOW FOR CUTTING POTATO-BOOTS.—Horace M. Keith, Commerce, Mich.
107,064.—SHOE FASTENING.—Jonathan Coykendall, Farmington, Ill.
107,065.—COMBINATION GAME BOARD.—Conrad Krath and Gustav Herman Moll, St. Louis, Mo.
107,066.—PECTORAL SYRUP OR MEDICINE.—George La Montague, Muskegon, Mich.
107,067.—PAPER FOR PRINTING, WRITING, AND OTHER PURPOSES.—John Langtree, New York, N. Y.
107,068.—INSTRUMENT FOR DRAUGHTING GARMENTS.—Ursula L. Leete, Owego, N. Y.
107,069.—CULTIVATOR.—James R. Little, Galesburg, Ill.
107,070.—FRUIT-CARRYING BOX.—George A. Lloyd, San Francisco, Cal.
107,071.—PROCESS OF OBTAINING OZONE OR OZONIZED AIR.—Oscar Loew, New York, N. Y., assignor to Reuben D. Turner and Wellwood, Murray, same place.
107,072.—VAPOR BURNER.—Josiah F. Marsh, Dubuque, Iowa.
107,073.—FLOWER-POT, VASE, AND BASKETS.—Thomas McClunie, Hartford, Conn.
107,074.—FIELD-ROLLER.—Robert Anderson McConaughy, Ripley, Ohio, assignor to James Reynolds, Senr,, same place.
107,075.—TELEGRAPH INSULATOR.—Samuel McKee, Pittsburg, Pa.
107,076.—BUCK BOARD WAGON.—Michel Miller, Buffalo, N. Y., assignor to himself and William Hewson, same place.
107,077.—FIRE ESCAPE.—William Miller, Boston, Mass.
107,078, antedated August 26, 1870.—REACTION ROTARY STEAM-ENGINES.—Francis E. Mills, San Francisco, Cal.
107,079.—KEROSENE-STOVE.—Robert B. Mitchell, Chicago, Ill.
107,080.—FOLDING COAT AND HAT-RACK.—James H. Monce, New York, N. Y.
107,081.—ROTATING ENGINE.—David Smith Money, Valdosta, Ga.
107,082.—CARRIAGE-POLE COUPLING.—Charles A. Moore, Akron, Ohio.
107,083.—CONSTRUCTION OF CAR WHEELS.—James K. Morange, and Napoleon B. Morange, Pittsburgh, Pa.
107,084.—FOLDING CHAIR.—Ezekiel P. More and Samuel J. Anderson, Cazenovia, N. Y.
107,085.—TRACE HOOK.—William H. Morgan, Alliance, Ohio, assignor to himself and Richard B. Geyer, Allegheny, Pa.
107,086.—TRACE HOOK AND CLIP FOR HARNESS.—William H. Morgan, assignor to himself and Richard B. Geyer, Allegheny, Pa.
107,087.—HARNESS-HOOK AND LOOP SHIELD.—Wm. H. Morgan, assignor to himself and Richard B. Geyer, Allegheny, Pa.
107,088.—PRESERVING BREAD.—Jean Joseph Auguste Mouriés, Phalsbourg, France.
107,089.—SCHOOL REGISTER.—Stephen S. Nash, New York, N. Y.
107,090.—CORN STALK CUTTER.—Andrew Jackson, Nebergall, Cedar county, Iowa.
107,091.—MACHINE FOR BORING AND MARKING.—Governeur M. Nickason, Ellenville, N. Y.
107,092.—SHINGLE MACHINE.—Carl Nordell, New York, N. Y.
107,093.—APPARATUS FOR ATTACHING STANDING RIGGING TO MASTS.—James Nute, Boston, Mass.
107,094.—HAND-LOOM.—James E. Nute, Lincoln, Me.
107,095.—FENCE.—Thomas W. Owens, Granville, Ohio.
107,096.—BOLT-FASTENING.—Peter Peterson, Abingdon, Ill.
107,097.—METHOD OF INLAYING WOOD.—T. W. Porter and H. K. Porter, Boston, Mass., assignor to themselves and Charles L. Marston.
107,098.—STEAM ENGINE.—Elting Post, Boston, Mass.
107,099, antedated August 27, 1870.—GUN-CARRIAGE.—Abiather F. Potter, Oakland, Cal.
107,100.—LOCK.—Titus Powers, New York, N. Y.
107,101.—ELECTRO-MAGNETIC RAILROAD-ALARM.—Edward H. Pursell, Galesburg, Ill.
107,102.—COTTON-GIN FEEDER.—Joe Ralston, Brenham, Texas.
107,103.—DRAIN-PIPE.—George Richardson, Milwaukee, Wis.
107,104, antedated September 1, 1870.—CAPSTAN.—James W Riggs, Wade, Ohio.
107,105.—APPARATUS FOR LIGHTING GAS BY ELECTRICITY.—Horace T. Robbins, Boston, Mass.
107,106.—BRIDGE.—Jacob Seabold, Kautz, Pa.
107,107.—MILK CAN AND COOLER.—Samuel Shattuc, Kipton, Ohio.
107,108.—MOWING-MACHINE.—George F. Shaw, West Roxbury, Mass.
107,109.—TUCK CREASING ATTACHMENT FOR SEWING-MACHINE.—John J. Sibley, New York, N. Y.
107,110.—CORN-PLOW AND PLANTER,—Clark Sintz, Clark county, Ohio.
107,111.—GUANO-DISTRIBUTING MACHINE.—George Washington Sizer and William Miller Owen, New Orleans, La.
107,112.—CARRIAGE AXLE.—Alfred E. Smith, Bronxville, N. Y.
107,113.—RAILWAY SWITCH.—Charles S. Smith, Seneca Falls, N. Y.
107,114.—LOW-WATER AND HIGH-STEAM INDICATOR.—Levi F. Smith, Philadelphia, Pa.
107,115.—SAFETY-TRUCK AND CAR-BRAKE.—William C. Smith, New Britain, Pa.
107,116.—COMBINED POWER-PUNCH AND SHEARS.—Abram C. Stannard, Milton, Wis.
107,117.—LOCOMOTIVE ASH PAN.—Henry A. Stoddard, Springfield, Mass.
107,118.—HARVESTER-CUTTER.—Daniel Stukey, Lancaster, Ohio.
107,119.—BRIDGE-GATE.—James D. Sturges, Chicago, Ill.
107,120.—PROPELLER FOR STEAM VESSELS.—Robert Sutton, New Castle, Del.
107,121.—NAIL EXTRACTOR.—George C. Taft, Worcester, Mass.
107,122.—REED ORGANS BELLOWS ACTION.—Simeon Taylor, Brighton, Mass.
107,123.—TRUNK LOCK.—James Terry, Jr., Terryville, Conn.
107,124.—DEVICE TO REGULATE THE FLOW OF SAP TO EVAPORATING PANS.—John Thomas, Hardwick, Vt.
107,125.—DEVICE FOR CUTTING WIRE OR CORD FROM BOTTLE-STOPPERS.—Justus A. Traut, New Britain, assignor to himself and Jeremy W. Bliss, Hartford, Conn.
107,126.—BINDING ATTACHMENT FOR HARVESTERS.—Dudley W. Travis, Enfield, and Charles M. Clinton, Ithaca, N. Y.
107,127.—AUTOMATIC GAS-REGULATOR.—Samuel O. Trudell, Detroit, Mich.
107,128.—SHEARING AND CLIPPING APPARATUS.—George Twigg, Birmingham, England.
107,129.—PHOTOGRAPHIC BACKGROUND.—Daniel W. Van Riper, Columbus, Ga.
107,130.—HAIR ROLL.—John H. Vogt and George Dietzel, New York, N. Y.
107,131.—BEDSTEAD-FASTENING.—James H. Waite, Orange, Mass., assignor to Rodney Hunt, James H. Waite, and David B. Flint, same place.

107,132.—HEEL-CALK.—Martin F. Walter and Chas. Standinger, Hartford, Conn.
107,133.—WAGON JACK.—Jeremiah W. Walton, Decatur, Mich.
107,134.—BREAST-STRAP PROTECTOR FOR HARNESS.—Lorenzo R. Ward, Ward's Corners, Iowa.
107,135.—MACHINE FOR GROOVING THE FRAMES OF CHAIR-SEATS. Gardner A. Watkins, Cavendish, Vt., assignor to the American Chair-seat Company, Gardner, Mass.
107,136.—CHAIR SEAT.—Gardner A. Watkins, Cavendish, Vt., assignor to the American Chair-seat Company, Gardner, Mass.
107,137.—CHAIR SEAT.—Gardner A. Watkins, Cavendish, Vt., assignor to the American Chair-seat Company, Gardner, Mass.
107,138.—CHURN-DASHER.—Thomas H. Weaver, Marietta, Ga.
107,139.—BUTTER-PAIL.—Henry P. Westcott, Seneca Falls, N. Y.
107,140.—LANTERN.—William Westlake, Chicago, Ill.
107,141.—OIL-CAN.—William Westlake, Chicago, Ill.
107,142.—CULTIVATOR.—Charles L. Whaite, Waverly, Pa.
107,143.—SCREW FOR SOLES AND HEELS OF SHOES.—Levi H. Whitney, Washington, D. C.
107,144.—GALLEY.—Frederick M. Wildman, Fairfield, assignor to himself and John S. Fairweather, Ridgefield Station, Conn.
107,145.—LOCK.—Horatio Willard and Peter Trunz, Evansville, Ind.
107,146.—DRAWING-FRAME.—Thomas S. Winn, Lawrence, Mass.
107,147.—APPARATUS FOR AND PROCESS OF DISTILLATION.—George S. Williamson, Gallatin, assignor to himself and Edwin R. McKean, Nashville, Tenn.
107,148.—AUTOMATIC CRADLE.—Darius Alger, Byron, Mich., assignor to himself and Theodore Barnum, same place.
107,149.—RAILROAD CAR HEATER.—Joshua G. Allen, Philadelphia, Pa.
107,150.—METHOD OF INLAYING WOOD, &c.—James S. Baldwin, Newark, N. J., assignor to Charles F. Ritchel, same place.
107,151.—WASHING-MACHINE.—Charles S. Banker and Alexander Purdy, Hector, N. Y.
107,152.—WOOD PAVEMENT.—Albert Bettely, Boston, Mass.
107,153.—JEWELERS' TOOL.—Daniel M. Bissell, Shelburne Falls, Mass.
107,154, antedated August 26, 1870.—SHOOTING STICK FOR PRINTERS.—Benjamin B. Blackwell, New York, N. Y.
107,155.—SOLE SEWING-MACHINE.—Lyman R. Blake, Boston, Mass.
107,156, antedated August 27, 1870.—CORN-PLANTER.—Joel L. Bond, Marshalltown, Iowa.
107,157.—SASH HOLDER.—Charles S. Bonney, Syracuse, N. Y.
107,158.—MANUFACTURE OF ALBUMEN.—Gustave Burgade, New York, N. Y.
107,159.—FLOOD GATE.—Thomas H. Breed, Dundee, Mich.
107,160.—DIE FOR HEADING BOLTS.—Frederick Bruso, Buffalo, N. Y.
107,161.—STEAM ENGINE.—David B. Caldwell, Cincinnati, Ohio, assignor to himself and John H. McGowan, same place.
107,162.—DITCHING PLOW.—George Chamberlin, Olean, N. Y.
107,163.—DEFLECTOR FOR WINDOW OF RAILROAD CARS.—William Conrad, Burlington, N. J.
107,164.—COFFIN.—James E. Cox, Cincinnati, Ohio.
107,165.—SIDE LIGHT FOR VESSELS.—William Darley, Chatham, England.
107,166, antedated August 27, 1870.—ENVELOPE.—Biram C. Davis, Binghamton, N. Y.
107,167.—FAN BLOWERS FOR SMITHS' FORGES.—Lindsay Duskin and Benjamin Sledge, Thomasville, N. C.; said Duskin assigns his right to William Dickson and J. D. Delap, same place.
107,168.—LOOM TEMPLE.—Warren W. Dutcher, Hopedale, Mass.
107,169, antedated August 26, 1870.—MACHINE FOR WASHING AND SCREENING ORES AND FERTILIZERS.—Alfred Duvall, Baltimore, Md.
107,170.—AXLE BOX FOR CARRIAGES.—Lewis R. Dye, Cranberry, N. J.
107,171.—WIRE CLOTH FOR COAL SCREENS.—Jacob G. Frick, Pottsville, Pa.
107,172.—PRUNING TOOL.—Samuel Gamwell, Wayland, Mich.
107,173.—SPRING CARRIAGE.—Demon R. Gould and Warren S Wickman, Chestertown, N. Y., assignors to themselves and Nelson B. Mallory, same place.
107,174.—PERMUTATION LOCK.—Henry Gross and Joseph L. Hall, Cincinnati, Ohio.
107,175.—WHIP-HOLDER.—Nelson Hanchett, Leslie, Mich.
107,176.—LOCK FOR SECURING STAMPS UPON BARRELS.—Joseph L. Harley, Baltimore, Md,
107,177.—TANNING LEATHER.—Clarence L. Jenkins, Omaha, Nebraska.
107,178.—WATER CLOSET.—John Keane, New York, N. Y.
107,179.—MACHINE FOR SHEARING METAL.—Artemus A. Kent, Lyons, Iowa.
107,180.—REFRIGERATOR AND SIDEBOARD.—William High Kern and Thomas Murat Davis, Philadelphia, Pa.
107,181.—STEAM GENERATOR.—John C. Kilgore, Phila., Pa.
107,182.—BALANCE.—George W. King, Georgetown, D. C.
107,183.—HORSE HAY-RAKE.—Gasway O. Lackey, Akron, Ohio.
107,184.—MILL FOR GRINDING BONES.—Alfred Lister and Edwin Lister, Newark, N. Y.
107,185.—FEED-WATER HEATER FOR STEAM-BOILER.—Daniel Lordon, Memphis, Tenn., assignor to himself and James Shields, Grand Rapids, Mich.
107,186.—COMBINED ADJUSTABLE CULTIVATOR AND GRAIN-DRILL. Thomas Lumsdon, Waterford, Conn.
107,187.—CIDER MILL.—Samuel Males, Cincinnati, Ohio.
107,188.—URINAL.—Samuel Males, Cincinnati, Ohio.
107,189.—CASE FOR BOTTLE AND GLASS.—Jules Mathieu, Paris, France.
107,190.—PERMUTATION LOCK.—Luke H. Miller, Baltimore, Md.
107,191.—GAS-FIXTURE.—David Milne, Norwich, N. Y.
107,192.—LUBRICATOR.—Thomas J. Mooers, Blossburg, Pa.
107,193.—HARVESTER.—Halvor H. Notestu, Deerfied, Wis.
107,194.—MACHINE FOR ROLLING TIRES.—Hippolyte Ulysse Petin, Rive de Gier, France.
107,195.—SAWING-MACHINE.—John T. Plass, New York, N Y.
107,196.—CAR-COUPLING.—Andrew J. Prescott, Catawissa, Pa.
107,197.—STOVE GRATE.—William Quay and Ezra M. Hinsdale, Troy, N. Y.
107,198.—PACKED ROTATING VALVE STEM.—Ezra Ransom, Flint, Mich.
107,199.—CLOTHES-DRIER.—George W. Richardson, Taunton, Mass.
107,200.—PAINT-BRUSH.—George L. Shuttleworth, Sharon, assignor to himself and Darwin E. Washburn, Woodstock, Vt
107,201.—TORPEDO FOR OIL-WELL.—Henry Julius Smith,
107,202.—NUMBERING-MACHINE.—James D. Smith, Washington, D. C.
107,203.—FEED-ATTACHMENT FOR THRASHING MACHINE.—Barnes Thompson, Horton, Iowa.
107,204.—CARDING-MACHINE.—George Thresh, Oxford, Me., assignor to himself and Jonathan Robert, same place.
107,205.—CLOTH MEASURING MACHINE.—Thomas Weedan and Thomas Tribe, Hillsdale, Mich.
107,206.—STEAM AND VAPOR ENGINE.—Franklin A. Morley, Syracuse, N. Y.
107,207.—COMBINED LOCK AND LATCH.—Samuel C. Weddington, Jonesborough, Ind.
107,208.—APPARATUS FOR THE MANUFACTURE OF ILLUMINATING GAS.—Henry G. Ludlow, Troy, N. Y.

REISSUES.

4,414.—ATTACHING KNOBS TO SPINDLES.—Matthew Andrew, Melbourne, Victoria.—Patent No. 101,808, dated April 12, 1870.
4,415.—WEIGHT FOR SASHES, CLOAKS, &c.—Daniel B. Lacy, Mott Haven, N. Y., Isaac A. Lacy, Saugerties, N. Y., Thomas T. Lacy, Jersey City, N. J., the Lacy Sash-Weight Company, and the Standard Sash Weight Company, New York, N. Y., assignees, by mesne assignments of Daniel B. Lacy.—Patent No. 58,170, dated September 18, 1868.
4,416.—CARRIAGE WHEEL.—James D. Sarven, New Haven, Conn.—Patent No. 17,520, dated June 9, 1857; reissue No. 3,709, dated August 11, 1868.

DESIGNS.

4,324.—CARPET PATTERN.—Robert R. Campbell, Lowell, Mass., assignor to Lowell Manufacturing Company, same place.
4,325.—CARPET PATTERN.—Robert R. Campbell, Lowell, Mass., assignor to Lowell Manufacturing Company, same place.
4,326.—CARPET PATTERN.—Robert R. Campbell, Lowell, Mass., assignor to Lowell Manufacturing Company, same place.
4,327.—CARPET PATTERN.—Robert R. Campbell, Lowell, Mass., assignor to Lowell Manufacturing Company, same place.
4,328.—CARPET PATTERN.—Robert R. Campbell, Lowell, Mass., assignor to Lowell Manufacturing Company, same place.
4,329.—CARPET PATTERN.—Robert R. Campbell, Lowell, Mass., assignor to Lowell Manufacturing Company, same place.
4,330.—CARPET PATTERN.—Robert R. Campbell, Lowell, Mass., assignor to Lowell Manufacturing Company, same place.
4,331.—CARPET PATTERN.—Robert R. Campbell, Lowell, Mass., assignor to Lowell Manufacturing Company, same place.
4,332.—CARPET PATTERN.—Robert R. Campbell, Lowell, Mass., assignor to Lowell Manufacturing Company, same place.
4,333.—CARPET PATTERN.—Robert R. Campbell, Lowell, Mass., assignor to Lowell Manufacturing Company, same place.
4,334.—KNITTED FABRIC.—Thomas Dolan, Philadelphia, Pa.
4,335.—CUPBOARD-LATCH.—Wm. Gorman, New Britain, Conn., assignor to the Russel and Erwin Manufacturing Company, same place.
4,336.—COLLAR BOX.—Samuel F. Hilton, Providence, R. I.
4,337.—NET FABRIC.—Robert H. Jefford, New York, N. Y., assignor to Abraham G. Jennings, same place.
4,338.—CLOCK CASE.—Samuel B. Jerome, New Haven, Conn., assignor to Samuel Peck & Co., same place.
4,339.—CARPET PATTERN.—Elemir J. Ney, Dracut, assignor to Lowell Manufacturing Company, Lowell, Mass.
4,340.—CARPET PATTERN.—Elimir J. Ney, Dracut, assignor to Lowell Manufacturing Company, Lowell, Mass.
4,341.—CARPET PATTERN.—Elimir J. Ney, Dracut, assignor to Lowell Manufacturing Company, Lowell, Mass.
4,342.—CARPET PATTERN.—Elemir J. Ney, Dracut, assignor to Lowell Manufacturing Company, Lowell, Mass.
4,343.—CARPET PATTERN.—Elemir J. Ney, Dracut, assignor to Lowell Manufacturing Company, Lowell, Mass.
4,344.—FLOOR OIL-CLOTH.—John T. Websters, New York City, and Albert E. Powers, Lansingburg, assignors to Deborah Powers, Albert E. Powers, and Nathaniel B. Powers, Lansingburg, N. Y.
4,345.—CURTAIN-CORNICE, &c.—Henry Whittemore, Passaic, N. Y.

MISCELLANEA.

Good Thing.—Mr. U. B. VIDAL, of Philadelphia, proposes to provide the street-cars with strong skirts or nets, supported on frames to extend from the flooring down to or near the ground. The object of the improvement is to save persons who fall from being run over by the car. The frame which supports the net is to be elastic, vertically, so as to yield when any portion touches the ground.

The Ironclads of the World.—Great Britain has forty-one ironclads and seven building; France, twenty-eight ironclads and twenty floating batteries; Prussia, five ironclads and two building; Austria, eleven ironclads; Russia, three ironclads, eleven turret ships, and six monitors; Italy, six ironclads; Spain, three ironclads; Turkey, seven ironclads; and the United States, forty-five ironclads (chiefly turret vessels for coast defence), and four building.

Preservation of Meat.—Mr. A. VOGEL professes to preserve the solid flesh in the following way: Equal volumes of salt and charcoal are intimately mixed and well stirred up with melted drippings, and enough carbolic acid added to be perceptible by its odor. A layer of this mixture is placed upon the bottom of a well pitched and strong barrel, and upon this is laid a layer of meat, which in turn is covered with the prepared mixture and well pressed down. Melted tallow or lard is poured on the top to serve as a cover. The tallow and the fat mixed with the salt keep out the air and moisture, and the carbolic acid prevents fermentation and destroys lower forms of life; the charcoal also acts as a preservative. It is said that meat can be indefinitely kept in this way, and that it loses none of its good properties.

Egyptian Eyesight.—One of the earliest lessons taught by the war has been the uselessness of arms of precision in the hands of unpractised and excitable troops. A gun that goes off by mere volition, as the Chassepot is said to do under certain circumstances, is simply an expensive means for wasting ammunition. But, besides coolness, other qualifications are necessary in order to convert ordinary soldiers into good marksmen. No amount of training would enable the Egyptians, for instance, to use a rifle with much success. An average Egyptian can see nothing distinctly at a distance of more than 500 yards, and has no acuteness in detecting an object within many feet. A recent traveller says that when the railway was constructed the utmost difficulty was found in procuring men capable of seeing or recognising the difference between signals only 100 yards off. Many candidates came, but few passed the test. One man was nearly passed, but the engineer was not quite satisfied that the fellow had not been "making good shots" at the colors. So he held up his hat at 150 yards, and the hapless signal-man pronounced it to be "the red flag." This is something worse than the color-blindness which is known to prevail among our own countrymen to a very large extent, and which has led to more than one railway accident.—*Pall Mall Gazette.*

The Originator of the Thames Embankment.—*Nature* reminds us that whatever claims Sir CHRISTOPHER WREN may possess to be considered the originator of the Thames embankment, it is hardly fair to leave out of sight those which belong to Sir JOHN KIVIET. The latter gentleman was a refugee from Rotterdam who came to England in 1666, and possessed some of the ingenuity of his brother-in-law, Admiral VAN TROMP. It does not appear how soon after the Fire in London it occurred to Sir JOHN to propose a river embankment, but as early as December 2, 1666, we find him examining the soil of the foreshores with a view to discovering whether it was suitable for making clinker-bricks. On the 6th of March following, EVELYN definitely proposed to the Lord Chancellor, "Monsieur KIVIET's undertaking to warfe the whole river of Thames, or Key it from the Temple to the Tower, as far as the fire destroied, with brick, without piles, both lasting and ornamental." We may presume it was favorably received by Lord CLARENDON, as upon the 22d of the same month EVELYN had audience of the King with reference to building the quay, and a few days later Sir JOHN KIVIET and the Diarist "went in search for brick earth in order to a greate undertaking." No further mention is made of the scheme, and we may perhaps conclude it was abandoned either on account of the unpopularity of the inventor (whose Dutch extraction would at that time have been a natural bar to success), or of the fall of CLARENDON at the ignominious close of the war with Holland. At any rate, KIVIET has some right to divide the honors with WREN, though, in view of the work just completed, we cannot regret that its execution was reserved for our own times.

BUSINESS AND PERSONAL.

[*Short notices in this column fifty cents per line each insertion.*]

GLYNN'S ANTI-INCRUSTATOR FOR STEAM BOILERS.—THE only and reliable article for removing and preventing incrustation. No foaming, and does not attack metals of boiler. Liberal terms to agents. C. D. FREDRICKS, 587 Broadway, N. Y.
April 19 tf

IMPORTANT TO INVENTORS.

WESTERN AND CO.'S PATENT AGENCY.

CHARLES ROGERS, Solicitor and Manager.

In connection with the publication of the ENGINEERING and MINING JOURNAL and the MANUFACTURER AND BUILDER, we have frequently received applications from subscribers and patrons to act as their agents in transacting business with the United States Patent Office; and in view of the increasing number and urgency of such requests, we have resolved to add this department to our business. We have accordingly organized

A COMPLETE PATENT AGENCY,

and now offer our services in procuring patents in this and foreign countries, and transacting all business relating to the obtaining of patents.

Being possessed of superior facilities, in connection with our associate attorneys in Washington and foreign countries, for the successful prosecution of this business, we do not hesitate to guarantee satisfaction to all who may entrust their business to our care.

We have engaged as solicitor and manager Mr. CHARLES ROGERS, a well-known expert in this department. Being a practical mechanic, and having been an examiner in the Patent Office at Washington for a number of years, besides enjoying an experience of more than twenty years as a solicitor of patents, Mr. ROGERS is intimately acquainted with all the details of the business, both in and out of the office.

The specifications, drawings, etc., prepared in our office, will be found to compare favorably with those prepared by any other establishment, while the intimate acquaintance of our manager with the routine of business in the Patent Office, gives us a decided advantage in managing difficult cases.

We are fully prepared to prosecute Rejected Cases and Cases in Interference and Infringements, and also to procure Reissues and Extensions of Patents.

We can also furnish Models for use in the Patent Office, to parties who may desire it, as we have made arrangements for this purpose with one of the most skilful machinists in this country, who possesses every facility for getting up models in the most perfect manner, at short notice, and on reasonable terms.

We shall give special attention to the prosecution of Rejected Applications, which have been improperly prepared by the inventor or incompetent attorneys.

We shall be ready at all times to furnish all necessary information and advice to intending applicants, and give our opinion as to the patentability of their inventions, free of charge; and we make it a rule never to take charge of a case unless we see a reasonable probability of obtaining a patent without first giving the inventor our candid opinion as to the probable result of the application.

OUR CHARGES.

Our charges are as moderate as those of any other responsible patent attorneys, as will be seen from the following figures: For preparing a case (whether simple or complicated) and attending to its passage through the Patent Office, our fee is from $30 to $40, which includes all the necessary papers and drawings. If the application is rejected we make no further charge, but prepare all necessary amendments, and, if requisite, appeal to the Board of Examiners-in-Chief. Most Patent Attorneys make an additional charge on each adverse action of the Patent Office, but we have found it more satisfactory to all parties interested to make our full charge at first; and as we expect no contingent fees, it is to our interest to prepare our cases properly at the commencement, thus avoiding annoyance to ourselves and delay in getting out the patent.

The cost of getting out a patent through our agency is—

For first Government fee, stamp, etc.	$16
" our fee	$30 to 40
" final Government fee	20
Total	$66 to $76

If the case has to be appealed, the applicant pays the Government fee on appeal, $10; but we shall ordinarily make no additional charge for our services. The first two items are payable when the application is sent in, and the second Government fee when a patent has been allowed. Before an appeal is taken, in any case, the applicant will be fully advised of all facts and charges, and no proceedings had without his sanction; so that all inventors who employ our agency will know in advance what their applications and patents are to cost.

For Rejected Applications prepared by others, our charges vary somewhat according to the nature of the case, but are generally as follows:

In advance, on receiving the case	$10
When the patent is allowed	$20 to 30
Total	$30 to $40

the applicant paying such Government fees as may be required.

For preparing and filling a Caveat,

Our fee is	$15
Government fee	10
Total	$25

For attending to the obtaining of Releases, Extensions, etc. and preparing Assignments, our charges vary according to the labor involved.

We are possessed of all the facilities for the successful prosecution of applications for patents in Great Britain, France, Belgium, and other foreign countries, on favorable terms.

Inventors who reside out of New York, and wish to procure a patent, need not go to the expense of visiting this city or Washington, but may send us a model of their invention, or a sketch and brief description; this will enable us to decide as to its probable novelty and patentability, and we can proceed at once to prosecute the case. We shall, however, be glad at all times to see our friends from any section, and give them such information as we are possessed of relating to patents, free of charge. A Post-office order for $16, to pay the first Government fee and stamp duty, should be sent along with the model; our fee $30 to $40, being payable as soon as the application is ready to be sent to Washington.

Patents granted through this agency will be described and illustrated in the columns of the ENGINEERING AND MINING JOURNAL or the MANUFACTURER AND BUILDER, without further charge to the inventor than the cost of the necessary cuts.

All communications to be addressed to

WESTERN & COMPANY,
P. O. BOX, 5969, 37 PARK ROW, NEW YORK

Advertisements.

The special advantages of the ENGINEERING AND MINING JOURNAL, *as a medium for advertisers, are so great and so widely known that it may seem almost needless to call attention to them. It is extensively circulated among the engineers of the country and takes a position in this respect before any other publication of the kind. It has a large and constantly increasing circulation among miners and mine owners, and men connected with mining operations generally. As it is the only paper in the country that makes this subject a specialty it has this field entirely to itself, and is the only direct and reliable means of reaching this class of persons. Being kept on file by almost every subscriber, it is dou'ly valuable as a permanent means of keeping an advertisement before the pu lic It is the recognized organ of the coal trade, and is taken extensively by the trade throughout the country and presents the very best means of reaching that very important class of men.*

Rates of Advertising.

The rate of advertising, compared with those of other weekly industrial publications, are very low, especially when the class of consumers among which its large circulation is almost entirely confined, is taken into consideration.

Back Page.....40 cents a line.
Inside Pages.....25 cents a line.

Engravings may head advertisements at the same rate per line, by measurement, as the letter-press.

MISCELLANEOUS.

THE BISHOP GUTTA-PERCHA WORKS,

422, 424 & 426 East 25th St.

Office at Factory, **NEW YORK.**

SAMUEL C. BISHOP, Proprietor,

The *only* manufacturer in the United States of every variety of goods, made from *Pure Gutta-Percha.*

SUBMARINE TELEGRAPH CABLES.

Submarine Wires, insulated for Mining and Blasting use.

Telegraph and Electric Wires for office and other uses, of all sizes; Cotton and Silk Covered Wires, of all sizes; Bishop's Compound Cordage for air lines and outside connections; Underground Wires, covered with Gutta-Percha and Lead protection; Underground Wires, with fibre and Bishop's Compounds.

Any kind required made to order.

In addition to Telegraph and Electric Goods, I make all kinds of Pure Gutta-Percha goods, such as Belting for use in Water; Sheet for Surgical use; Sheet for various Mechanical uses; Lining for Acid and Chemical Baths; Bottles, Pitchers, and Funnels for Acids; Tissue Sheets for Caps and Hats; Soda and Beer Pipe; Bosses for Flax Machinery, etc., etc.

N. B.—TILLOTSON & CO., 8 Dey street, New York, and BLISS, TILLOTSON & CO., 247 South Water street, Chicago, are General Agents for the sale of any Telegraph and Electric Goods made by me, at Factory prices.

JOHN THORNLEY, 503 Chestnut street, Philadelphia, Pa., is Agent for the sale of any goods made by me at Factory prices.

☞ Orders also received at Factory for all kinds made.

☞ Any goods of manufacture, "excepting Telegraph and Electric Goods," are for sale in New York, by H. G. NORTON & CO., 26 Park Place; RUBBER CLOTHING CO., 347 Broadway; A. D. & C. A. HODGMAN, 201 Broadway, N. Y. sept13:4m

DEPARTMENT OF PUBLIC WORKS, No. 237 Broadway.—To Contractors.—Proposals enclosed in a sealed envelope, indorsed with the title of the work, and the name of the bidder written thereon, will be received at this office until Tuesday, September 13, 1870, at 11 o'clock A. M.:

For completing sewer in Fourth avenue, between Fifteenth and Seventeenth streets.

Blank forms of proposals, together with the specification and agreement, can be obtained at this office.

WILLIAM M. TWEED,
Commissioner of Public Works.
New York, August 31, 1870. 1t

MICROSCOPES FOR SCIENTIFIC INVESTIGATIONS and Educational Purposes. Price list sent free. T. H. McALLISTER, Optician, Dec21-6m 49 Nassau street, N. Y.

STEAM PUMPS.

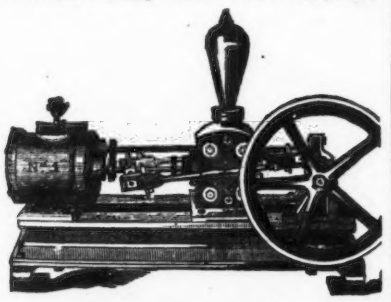
THE WOODWARD

Steam Pump Manufacturing Company.

MANUFACTURERS OF THE

WOODWARD PATENT IMPROVED SAFETY

Steam Pump and Fire Engine.



STEAM, WATER, AND GAS FITTINGS OF ALL KINDS.

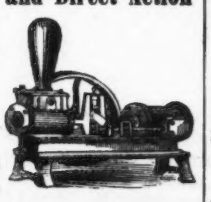
Also dealers in WROUGHT IRON PIPE, BOILER TUBES, etc. Hotels, Churches, Factories, and Public Buildings, heated by Steam, Low Pressure.

Woodward Building, 76 and 78 Centre street, corner Worth street, New York. Formerly 77 Beekman street. mar 14-1y GEORGE M. WOODWARD, Pres't.

J. CLAYTON'S

Patent Fly Wheel and Direct Action

STEAM PUMPS,



HAND PUMP AND STEAM ENGINE COMBINED.

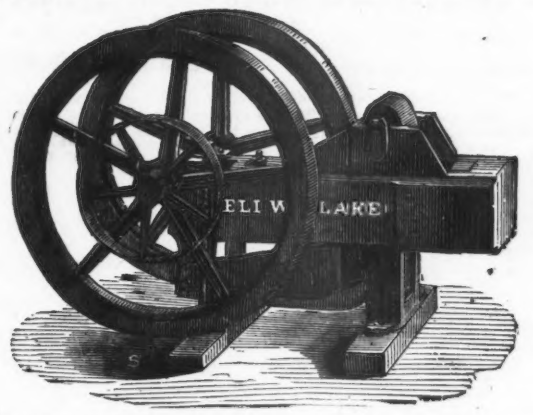
These pumps are the cheapest first-class pumps in the market.

All sizes made to order at short notice.

JAMES CLAYTON, 24 & 26 Water st., Nov18-tf Brooklyn, N. Y.

MISCELLANEOUS.

BLAKE'S STONE BREAKER.



The office of this Machine is to break Ores and Minerals of every kind into small fragments, preparatory to their further comminution by other machinery.

This machine has now been in use, enduring the severest tests, for the last ten years, during which time it has been introduced into almost every country on the globe, and is everywhere received with great and increasing favor as a labor-saving machine of the first order.

Illustrated circulars, fully describing the machine, with ample testimonials to its efficiency and utility, will be furnished on application, by letter to the undersigned.

☞ The Patents obtained for this machine in the United States and in England having been fully sustained by the courts, after well contested suits in both countries, all persons are hereby cautioned not to violate them; and they are informed that every machine now in use or offered for sale, not made by us, in which the ores are crushed between upright convergent faces or jaws actuated by a revolving shaft and fly-wheel, are made and used in violation of our patent.

Mch. 14-1y. **BLAKE BROTHERS, New Haven, Conn.**

JOHN A. GRISWOLD, ERASTUS CORNING, — ERASTUS CORNING, JR., CHESTER GRISWOLD.

JOHN A. GRISWOLD & CO.,

PROPRIETORS OF THE

RENSSELAER IRON WORKS,

TROY, N. Y.

Bessemer Steel Works, Fort Edward Blast Furnace and Columbia Blast Furnace

MANUFACTURERS of PIG IRON, RAILROAD, MERCHANT AND SHIP IRON,

Bessemer Steel Rails, Axles, Tyres, Shafting Plates and Steel Forgings,

OF ALL DESCRIPTIONS.

Office in New York, No. 56 Broadway.

May 17:1y

NEW JERSEY ZINC COMPANY.

B. S. GIBLIN, Treasurer. — GEORGE A. BELL, President.

WORKS NEWARK, N. J., OFFICE No. 61 MAIDEN LANE NEW YORK.

Franklinite Pig Iron (Spiegeleisen), Spelter, Oxide of Zinc, Spiegeleisen Cinder for Blast Furnaces.

May 24:1y

LEHIGH ZINC COMPANY.

GORDON MONGES, Treasurer. — B. C. WEBSTER, President.

WORKS, BETHLEHEM, PA. OFFICE, 333 Walnut Street, Philadelphia.

JOHN JEWETT & SONS, AGENTS, 182 FRONT STREET, NEW YORK.

OXIDE OF ZINC, SPELTER, SHEET ZINC.

Jun28:1y

IMPROVED MINING AND WRECKING PUMPS.

LEBBY AND DUC PATENTS.

MANUFACTURED SOLELY BY

T. F. ROWLAND, CONTINENTAL WORKS,

Greenpoint, Brooklyn, N. Y.

New York Office, No. 64 Broadway, Room 33.

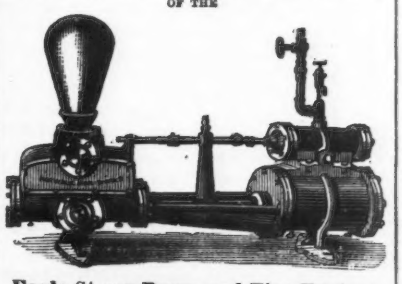
☞ Send for Illustrated Circular. july16-1y-is

NORWALK IRON WORKS,

SOUTH NORWALK, CONN.,

Sole Proprietors and Manufacturers

OF THE



Earle Steam Pump and Fire Engine,

(Patented in the United States, France, England and Belgium.)

Air and Vacuum Pumps,

STEAM AND BLOWING ENGINES,

Pumping Engines for Water Works, Horizontal and Tumbling Beam Engines, Mining, Wrecking, and Supply Pumps.

IRON AND BRASS CASTINGS, of every description.

☞ Send for Illustrated Catalogue. mch13-1y

HYDRAULIC WORKS.

MANUFACTORY,

BROOKLYN, N. Y.

Steam Pumping Engines, Single and Duplex, Worthington's Patent, for all purposes, such as Water Works Engines, Condensing or Non-condensing; Air and Circulating Pumps, for Marine Engines; Blowing Engines; Vacuum Pumps, Stationary and Portable Steam Fire Engines; Boiler Feed Pumps, Wrecking Pumps,

MINING PUMPS,

Water Meters, Oil Meters; Water Pressure Engines; Stamp Mills for Gold, Silver and Copper Ore; Eaton's Patent Amalgamators for Gold and Silver; Steam and Gas Pipe, Valves, Fittings, etc. Iron and Brass Castings.

☞ Send for Circular.

H. R. WORTHINGTON,
feb1-1y 61 Beekman street, New York.

COAL SHIPPERS.

SAMUEL BONNELL, JR., OFFERS FOR SALE his SUGAR CREEK and HONEY BROOK

LEHIGH COALS,

OFFICE:

43 and 45 TRINITY BUILDING, 111 BROADWAY, New York. Jan:1y

WHITE, FOWLER & SNOW.

Wilkesbarre and Lehigh Coal,

FOR STEAM AND FAMILY USE.

OFFICE

Room No. 75, 111 BROADWAY, (Trinity Building).

JNO. WHITE,
jan1-1y LINDLEY H. FOWLER,
LOUIS T. SNOW.

WILKESBARRE COAL, DELIVERED DIRECT from the Mines of

The Wikesbarre Coal and Iron Co.,

or for re-shipment at

HOBOKEN AND JERSEY CITY.

OFFICE:

apl-1y No. 80 Broadway, New York.

COAL SHIPPERS.

THE DESPARD COAL COMPANY OFFER their Superior DESPARD COAL to Gas Light Companies throughout the country.

MINES IN HARRISON COUNTY, West Virginia.

Wharves, Locust Point, Company's Office, No. 29 South st. } Baltimore.

AGENTS:

PARMELE BROTHERS, No. 32 Pine street, New York.
BANGS & HORTON, No. 31 Doane street, Boston.

Among the consumers of Despard Coal we name Manhattan Gas Light Co., New York; Metropolitan Gas Light Co., New York; Jersey City Gas Light Co., Jersey City, N. J.; Washington Gas Light Co., Washington, D. C. Portland Gas Light Co., Portland, Maine.

☞ Reference to them is requested. may30-1y

LEWIS AUDENRIED & CO., MINERS AND Shippers of the following celebrated

ANTHRACITE COALS.

From Philadelphia and the Mines,

DIAMOND, Red Ash; SPOHN, Red Ash; ORCHARD, Pink Ash; BROAD MOUNTAIN, White Ash; LOCUST MOUNTAIN, White Ash; BLACK HEATH, White Ash; Old Company's Lehigh; Wilkesbarre.

From Port Johnston and Jersey City,

Old Co.'s Lehigh, Hazleton, Wilkesbarre, and Shenandoah Coals.

Also the superior CUMBERLAND COALS.

BROAD TOP, SEMI-BITUMINOUS, at Philadelphia. BARTON, GEORGES CREEK, at Baltimore. BARTON, GEORGES CREEK, at Alexrndria.

205 Walnut street, Philadelphia; 14 Kilby street, Boston 34 Westminster st., Providence; 24 Second st., Baltimore

110 BROADWAY, NEW YORK. Jan13.y

G. B. LINDERMAN & CO.,

MINERS,

Sugar Loaf, Lehigh Coal.

OFFICE, 50 TRINITY BUILDING, 111 BROADWAY
may23-1y NEW YORK.

COXE BRO.'S & CO., CROSS CREEK COLLIERY, Miners and Shippers of the Celebrated

Cross Creek Free Burning Lehigh Red Ash

COAL.

FROM THE BUCK MOUNTAIN VEIN.

OFFICES;

Philadelphia, No. 341 Walnut street.
Drifton, Jeddo P. O., Luzerne Co., Pa.
Agent in New York, SAMUEL BONNELL, Jr., Room 43, Trinity Building,
feb-1y 111 Broadway.

THE FAIRMONT GAS COAL COMPANY OF NEW YORK.

OFFICE

TRINITY BUILDING, 111 BROADWAY, ROOM NO. 71.
WHARVES AT
LOCUST POINT, BALTIMORE.
MINES AT
FAIRMONT, MARION COUNTY, WEST VIRGINIA.

The Fairmont Gas Coal Company, of New York, solicit the orders of Gas Companies for their VERY SUPERIOR GAS COAL.

The Coal from their mines is remarkably free from sulphur, and will be carefully mined and carefully shipped, free of slate and other impurities. This Coal has an illuminating power of 19 candles, yielding over 10,000 cubic feet of Gas to the ton, and an excellent Coke.

Refer to the Manhattan Gas Light Co., of New York, and the New York Gas Light Co., of New York.

N. MEYLERT, President.
HIRAM BENNER, Sec. and Treasurer. Ap5:2t

LOVE, BOYER & CO.,

SHIPPERS OF

Anthracite and Bituminous Coals,

AMERICAN BUILDINGS, No. 334 WALNUT STREET, And Pier 19 Port Richmond. **PHILADELPHIA.**

Agents for Cumberland Vein Bituminous Coal.
Mar 8:6m

HONEY BROOK COAL COMPANY, Exclusive Miners and Shippers of the Celebrated

Honey Brook Lehigh Coal,

No. 111 BROADWAY, NEW YORK.

JAMES H. LYLES, Agent.

Wharves, Port Johnson, N. J. Philadelphia office, 209 Walnut street.

ap20-1y J. B. McCREARY, President.

RANDOLPH BROTHERS, Sole Agents of the original

Spring Mountain Lehigh Coal.

Extensively used for Smelting Iron.

☞ Rooms, 28 and 30 Trinity Building,

pr6tf NEW YORK.

POWELTON COAL AND IRON COMPANY, Sole Shippers of the Celebrated

Powelton Semi-Bituminous Gas

AND ANTHRACITE COALS,

104 Walnut street, Philadelphia.

BRANCH OFFICES:

New York, Trinity Building; 17 Doane street, Boston Cleveland, O.; Fittsburgh, Pa. jan30-1s

THE NEWBURGH ORREL COAL COMPANY.

Mines at Newburgh, Preston Co., W. Va.

Company's Office, No. 52 S. Gay St. Baltimore, Md.

C. OLIVER O'DONNELL.....President.
G. W. MAHOOL.....Secretary.

This Company offer their very superior Gas Coal at lowest market prices.

It yields 10,996 cubic feet of gas to the ton of 2,240 lbs., of good illuminating power, and of remarkable purity; one bushel of lime purifying 6,792 cubic feet, with a large amount of coke of good quality.

It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York, the Brooklyn and Citizens' Gas Light Companies of Brooklyn, N. Y., the Baltimore Gas Light Company of Baltimore, Md., and Providence Gas Light Company, Providence, R. I.

The best dry coals shipped, and the promptest attention given to orders. sep21-1y

PUBLICATIONS.

NOW READY.

Third Edition, Seventh Thousand, Revised, Enlarged, and Improved,

HOPTON'S CONVERSATIONS on MINES,

BETWEEN

FATHER AND SON,

ENLARGED FROM 112 TO 192 PAGES.

The Following are the Contents:

Air, why it is propelled down, into and around the workings
" Quantity of, produced by the furnace.
" Friction of
" The great friction of produced by one mode of ventilation, and how reduced by another
" Pure added to impure (plans.
" Splitting of (plans)
" One current of (plans)
" One current of, and how to adopt separate currents (plan)
" Dividing of, but not into "separate and and distinct" current (plans)
" Crossings (see H on plans)
" Weight of in shafts
" How to find the weight of
" Table of pressure in shafts
" Expansion of
" Its velocity and force
" Rush of, into each division
" Quantity produced by natura ventilation
" Splitting, why it should be adopted
" Splitting, why the workmen object to Mr. Hopton adopting the mode
Anemometer, measurement of air by, engraving of
Area of a pit, how to find
Barometers, Showing the time of an outlet of gas in mines (engraving)
Bricks, how to find the number in the walling of a shaft.
Buddle's plan
Circumference of a pit, how to find
Coal, several ways of working it out, and why man methods of working it out are adopted
" Working out in banks (plans)
" Working it out in following up banks (plan)
" Working out in pillars (plans)
" Working out in long wall (plans)
" Working out in drifts (plans)
" Working out with no regularity (plan)
" Working out by the "end way" or in endings (plan)
Cubical Contents of a pit, how to find
Dialing, the mode of
Dials, several engravings
" How constructed
" How fixed in mine surveying
" Needle, its variations
Diameter of shaft
Dip of mine, how to find and lay on (plan)
Explosion, the power of an
" At Lund-hill, in what part of the mine it was supposed to take place (plan)
" How the power may be diminished
Furnace, how to find the horse-power of
" The place of fixing, to produce the largest ventilating current
" Engravings of ground floor, front and back view
" Remarks upon
Gases, (carbonic acid) composition of
" Do. properties of
" (After, or choke damp) composition of
" (Carburetted hydrogen) do.
" Choke damp and carbonic acid, not one and the same in quality
" The effect produced on people by inhaling such
" The quantity required for an explosive mixture
" The elasticity of
" The weight of
" The nature and quality of
" Why some mines generate and produce more than others
" Why some mines generate a mixture of
Goaf, or gob, how tramrods are made through (plan
Lund-hill (plan)
Managers, who are best competent to manage mines
Miscellaneous questions
Natural ventilation
Planning, how workings are laid on the plan
Regulations (see R on plans)
Safety Lamps, why flame will not penetrate through, engraving of
Sections on mechanical ventilation
Summary of accidents
Surveying, how mines are with the dial
Surveying, how mines are with the theodolite
Tables of weights and measures
Temperature on surface
Temperature in mines
Temperature, difference of between down and up-cast
Theodolites for mine surveying
Theodolites, how constructed
Theodolites, the magnetic needle dispensed with, and how workings are laid on plan, with Theodolite surveying
Theodolites, how mines are surveyed with them
Up-cast larger than down-cast (plan)
Ventilating mines by mechanical power
Ventilation, several ways of
Weather, how a change of affects the workings
Workmen, capabilities of

Testimonials, Reviews, etc.

"Such a work, well understood by miners, would do more to prevent colliery accidents than an army of inspectors."—*Colliery Guardian.*

"The book cannot fail to be well received by all connected with collieries."—*Mining Journal.*

"Its contents are really valuable to the miners of this country."—*Miner's Conference.*

"I have works priced at £4 that do not contain the same information."—W. W. KENRICK, Colliery Viewer.

"The work is replete on the subject of underground management."—M. BARNES, Colliery Proprietor.

"I have had twenty years' management. It is the best work I ever read, and deserves to be circulated in every colliery district."—JOSEPH EAMES.

WESTERN & CO.,
Sole Agents for the United States.

For sale at the office of the ENGINEERING AND MINING OURNAL, 37 Park Row, New York, and through any oeiseller. Price $1.

PUBLICATIONS.

PUBLICATIONS OF THE

AMERICAN INSTITUTE OF ARCHITECTS.

—o—

WESTERN & COMPANY

Having made arrangements with the Committee on Library and Publications of the above Association, are prepared to furnish the publications of the Institute to the trade and the public.

The Publications consist of the Proceedings of the Annual Conventions of the Institute, and Papers read before the Chapters of that body, as well as Papers contributed by Members of the Institute and published by its Committee on Library and Publications.

They are elegantly printed Pamphlets of large quarto size, with two columns to a page.

The Pamphlets thus far issued comprise the publications for two years past, and cover transactions of three years.

LIST OF PUBLICATIONS TO DATE.

I.

PROCEEDINGS OF THE ANNUAL CONVENTION OF THE

American Institute of Architects

Held in New York, October 22d and 23d, 1867.

Comprising, Minutes of the Convention, The Annual Address by Richard Upjohn, President; Reports of the Trustees and Standing Committees, and the Closing Address.

32 Pages, Quarto.....Price, 30 cents.

II.

FIRE-PROOF FLOORS

FOR

Banks, Insurance Companies, Office Buildings, and Dwellings.

Tables Shewing the Distances from Centres at which Rolled Iron Beams should be Placed, and the Weight of Metal per superficial foot of the Floor,

BY R. G. HATFIELD, F. A. I. A.

8 Pages, Quarto.....Price, 30 cents.

III.

Proceedings

OF THE

SECOND ANNUAL CONVENTION

Held in New York, December 8, 1868.

Comprising the Minutes of the Convention, The President's Address by Richard Upjohn, Esq., and the Reports of Trustees and Standing Committees.

16 Pages, Quarto.....Price 40 cents.

IV.

REMARKS

ON

FIRE-PROOF CONSTRUCTION;

A Paper read before the New York Chapter of the American Institute of Architects, April 8, 1869.

BY P. B. WIGHT, F. A. I. A.

8 Pages, Quarto.....Price, 30 cents.

V.

THE

Architectural and Other Art Societies of Europe;

SOME ACCOUNT OF THEIR

ORIGIN, PROCESSES OF FORMATION, AND METHODS OF ADMINISTRATION,

With suggestions as to some of the conditions necessary for the maximum success of a National American Architectural-Art Society, with its local dependencies.

BY A. J. BLOOR,

FELLOW OF THE AMERICAN INSTITUTE OF ARCHITECTS

Read before the New York Chapter A. I. A. February 16, 1869.

62 Pages, Quarto..... Price $1

VI.

PROCEEDINGS OF THE THIRD ANNUAL CONVENTION, held in New York, Nov. 16 and 17th, 1869.

Comprising the Annual Address by Richard Upjohn, President; the Reports of Trustees, Standing Committees and Chapters; papers read by Adolph Chess, R. G. Hatfield, and Richard Upjohn; Debates on matters of Professional interest, and the closing address of Professional Guilds, by E. L. Godkin. 69 pages quarto. Price $1.

The above Pamphlets may be had singly, and will be sent by mail to any address on receipt of the price.

THE TRANSACTIONS BOUND.

The Publications of the Institute may also be had bound in cloth, making a handsome quarto volume of 196 pages, comprising the Transactions of the Institute for three years, ending November 16, 1869, the time of holding the Annual Convention for 1869. Price, $4.

WESTERN & COMPANY will also publish the papers to be read at the meetings of Chapters of the Institute, during the coming year in the ENGINEERING AND MINING JOURNAL, and abstracts in the MANUFACTURER AND BUILDER, which will be duly announced. Address,

WESTERN & COMPANY,
No. 37 PARK ROW, NEW YORK.

PUBLICATIONS.

THE MINES OF THE WEST:

A REPORT TO THE

SECRETARY OF THE TREASURY.

Being a full Statistical Account of the

MINERAL DEVELOPMENT OF THE PACIFIC STATES for the year 1868, with

Sixteen Illustrations,

and a Treatise on the Relation of Governments to Mining, with a delineation of the Legal and Practical Mining Systems of all Countries, from early ages to the present time. By

ROSSITER W. RAYMOND, PH.D.,

U. S. COMMISSIONER OF MINING STATISTICS.

CONTENTS:

INSTRUCTIONS FROM THE SECRETARY OF THE TREASURY.
LETTER OF THE COMMISSIONER TO THE SECRETARY.
REPORT:
PART I.—Observations of the present condition of the mining industry:
SECTION I.—*Notes on California:*
Chapter I.—The new Almaden mines.
II.—The Mother Lode of California.
III.—The quartz and placer mines of Nevada County.
IV.—Giant powder and common powder.
SECTION II.—*Notes on Nevada:*
Chapter V.—Present condition and prospects of the Comstock mines.
VI.—Ormsby, Washoe, and Churchill Counties.
VII.—Lander County.
VIII.—Nye County.
IX.—Lincoln County.
X.—Esmeralda County.
XI.—Humboldt County.
SECTION III.—*Notes on Montana:*
Chapter XII.—General geological features.
XIII.—Population, property, railroad, etc.
XIV.—Placer mines.
XV.—Quartz mines.
XVI.—Operations of the United States law.
SECTION IV.—*Notes on Idaho:*
Chapter XVII.—Report of Mr. Ashburner
XVIII.—The War Eagle tunnel.
XIX.—Bullion product.
SECTION V.—*Notes on other mining fields:*
Chapter XX.—Arizona.
XXI.—Utah.
XXII.—The Isthmus of Panama.
PART II.—The relations of government to mining:
Introduction.
SECTION VI.—*Mining law.*
Chapter XXIII.—Mining and mining law among the ancients.
XXIV.—Mining law in the middle ages.
XXV.—The Spanish mining law.
XXVI.—Modern German codes.
XXVII.—The code of France.
XXVIII.—Mining law of Switzerland.
XXIX.—Mining law of England.
XXX.—Mining regulations of Australia.
XXXI.—Mining laws of Canada.
XXXII.—Conclusions.
SECTION VII.—*Mining Education:*
Chapter XXXIII.—Means of disseminating information with regard to mining and metallurgy; the National School of mines.
SECTION VII.—*Mining Education—Continued.*
Chapter XXXIV.—The Freiberg School of Mines.
XXXV.—The Paris School of Mines.
XXXVI.—The Prussian School of Mines.
XXXVII.—The School of Mines at Clausthal.
APPENDIX.—Statistics of bullion, ores, etc., at San Francisco, for the Year 1868.

EXTRA CLOTH, $1 75.

Address, **WESTERN & CO.,**
No. 37 PARK ROW, NEW YORK.

ENGINEERS.

P. H. VAN DER WEYDE, M. D.,

(Late Professor of the N. Y. Medical College, of Mechanics, etc., at the Cooper Institute, and of Industrial Science at the Girard College, Philadelphia.)

Analytical & Consulting Chemist and Engineer.

RESIDENCE, 73 Seventh Street.
Office ENGINEERING AND MINING JOURNAL, 37 Park Row, New York City. jan30tf

R. P. ROTHWELL,
MINING AND CIVIL ENGINEER AND METALLURGIST,

From the Imperial School of Mines, Paris, member of the Geological Society of France, etc,

OFFICE, WILKESBARRE, PA.

Having had a large practical experience in Europe and this country, is prepared to examine and report on all kinds of mineral property, superintend mines, and metallurgical works, assay ores, etc. 18-2-qp

EDWARD C. MILLER, ARCHITECT AND CIVIL ENGINEER, Nos. 4 and 6 Broad street, Rooms 17 and 17½.

Has been engaged for many years in preparing plans for Churches, Dwellings and other Buildings, and in superintending their erection, and has superintended a considerable portion of the various constructions in the Central Park of New York, and Prospect Park, Brooklyn, having, in the latter case, prepared the plans, specifications and estimates of all the Bridges, the Fountain Basin, and minor works of adornment, upon which these structures have, for the most part, been completed. Is now ready to furnish Designs, Working-Drawings and Specifications for any description of building, and to superintend the construction thereof. References: Jas. S. T. Stranahan, Esq.; Martin Kalbfleish, Esq.; Andrew H. Green, Esq.; Charles Hudson, Esq. mar 8

ADOLPH OTT,
CHEMICAL ENGINEER,

May be employed professionally as an expert on practical subjects, involving both Chemical and Mechanical knowledge. A specialist in various branches of Technology. Assays and Analyses of all kinds. Address, Editorial Rooms of the "Engineering and Mining Journal," 37 Park Row, New York City.

☞ Written communications preferred. nov28-tf

THEODORE ALLEN,
ENGINEER,
No. 45 William street, New York.

Designs and Specifications prepared for all kinds of Iron Ships and Steam Machinery. Construction and Repairs superintended. Experiments conducted. Advice given, etc. All kinds of Machinery furnished Manufacturers' prices. feb8-tf

JULIEN THOULET, GRADUATE OF THE University of Paris, Member of the Society of Engineers of France, employed for several years in Spain, Italy, and America, as Chemist and Mining Engineer, would accept an engagement in a mining or smelting establishment. The highest references furnished.
Address, by letter, No. 3 William street, New York. Feb. 15:tf

WILLIAM F. McNAMARA,
SOLICITOR OF PATENTS
AND COUNSELLOR-AT-LAW.
No. 37 PARK ROW, NEW YORK, ROOM 22.
Advice in Patent Law given free. mar 8:tf

ZINC.—Mr. Thum, Zinc Metallurgist and engineer, widely known through Dr. Percy's book on metallurgy, will be open for a re-engagement to erect or inspect zinc smelting and manufacturing works. Has had thirteen years' experience in the erection and management of zinc works, the last five years in England. First class references. Apply to Mr. THUM,
Aug30:6t. Bagilit, Flintshire, England.

INSTRUCTION.

SCHOOL OF MINES, COLUMBIA COLLEGE.

FACULTY.—F. A. P. BARNARD, S.T.D., LL.D., PRESIDENT; T. EGLESTON, JR., E. M., Mineralogy and Metallurgy; C. F. CHANDLER, PH. D., Analytical and Applied Chemistry; JOHN TORREY, M.D., LL.D., Botany; C. A. JOY, PH. D., General Chemistry; W. G. PECK, LL.D., Mechanics; J. H. VAN AMRINGE, A.M., Mathematics; O. N. ROOD, A.M., Physics; J. S. NEWBERRY, M.D., LL.D., Geology and Paleontology. Regular courses for Mining Engineering; Metallurgy; Geology and Natural History; Analytical and Applied Chemistry. Special students received for any of the branches taught. Particular attention paid to Assaying. For further information and catalogues, apply to
DR. C. F. CHANDLER,
nov21-1y-is Dean of the Faculty.

RENSSELAER POLYTECHNIC INSTITUTE. Troy, N. Y.—Full Courses of Instruction in Civil, Mining, and Mechanical Engineering. Chemistry, and Natural Science Appropriate degrees conferred. Re-opens Sept. 14. For the Annual Register, giving full information, address Professor CHARLES DROWNE, Director. aug.9:6t

DUNCAN, SHERMAN & CO.,

BANKERS,

Corner of Pine and Nassau Streets, New York.
Issue Circular Notes and Letters of Credit for Travelers, available in all the Principal Cities in the World.

TRANSFERS OF MONEY TO EUROPE AND THE PACIFIC COAST BY TELEGRAPH.

☞ Interest allowed on Deposits. feb-1y

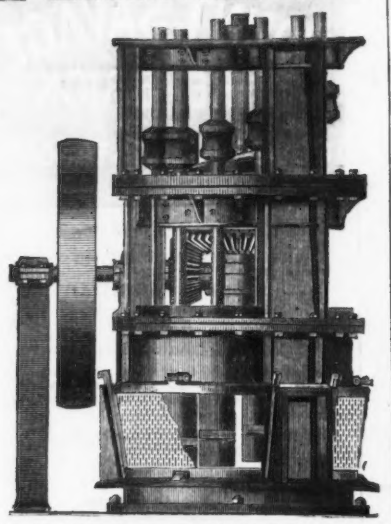
WOOD ENGRAVING
EXECUTED AT THE OFFICE OF
The Engineering and Mining Journal,
No. 37 PARK ROW, NEW YORK CITY.

FILE-COVERS. FILE-COVERS. For preserving the numbers of the ENGINEERING AND MINING JOURNAL. Price $1 50. For sale by
WESTERN & CO., 37 Park Row, New York.

MAGIC LANTERNS FOR SUNDAY Schools, Academies, Public Exhibitions, and Parlor Entertainments. Illustrated priced catalogues sent free. T. H. McALLISTER, Optician,
Dec 21.6m 49 Nassau street, N. Y.

MINING MACHINERY, ETC.

MINING MACHINERY OF ALL KINDS. MANUFACTURED BY MOREY & SPERRY.



HOWLAND PATENT ROTARY BATTERY

of 12 stamps. It requires no frame to put it up. Guaranteed to crush 2½ to 3 tons per day to the stamp. The best Battery ever used for amalgamating gold, or crushing silver ores, dry or wet. Can be put up on a mine in running order for one-half the price of the straight battery, and in three days after its arrival at the mine. 12-stamp battery, 20,000 pounds, with frame complete, price $3,000; 6-stamp battery, 8,000 pounds, price $1,300. Every mill run at shop before shipping.

CALIFORNIA STAMP MILLS,

All the various styles of Pans, Amalgamators, Separators, Settlers, Concentrators, Dry or Wet, for working Gold, Silver or Copper Ores, the same as built in California and at lower prices. SHOES AND DIES made of the best white iron. Send sizes and we will make patterns and forward Shoes and Dies at low prices. Engines, Boilers and fixtures, and other Machinery made to order. Also, Howland's Patent Rotary Valve Double or Single Engines.

Irons for the best California 10-stamp mill, straight battery, complete, $1,600. Irons for low mortar, old style mill, much less.

☞ Send for a Circular.

Address

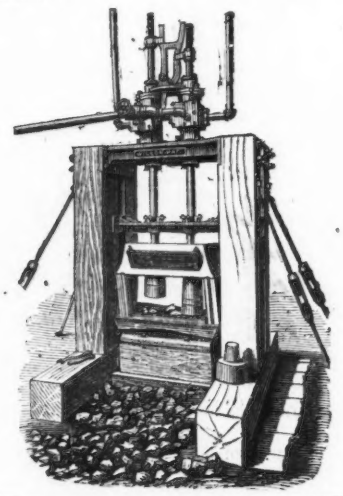
MOREY & SPERRY,
Jan 10:y 95 Liberty Street New-York.

THE WILSON PATENT

Steam Stamp-Mill Company,

OF PHILADELPHIA, PA.

Are now prepared to supply Miners and other parties with their



New Steam Stamp-Mills

AT THE SHORTEST NOTICE.

These Mills have now been in operation for upwards of a year, and have proved to be the most durable and efficient, as well as the lightest for transportation, of any mills now used. The valve gear is of the simplest and most durable construction, readily adjustable by movable cams on the piston rods or stamp stems, thereby giving the operator absolute control of the length and velocity of motion and force of the blow. These Mills are adapted for both dry and wet crushing, and for the hardest rock or softest cement. These Mills are every way equivalent to a Twenty Stamp Mill. For further particulars call on or address

THE WILSON PATENT STEAM STAMP-MILL COMPANY,
Aug31-1y 326 Walnut street, Philadelphia.

KROM'S DRY ORE CONCENTRATOR.

Concentration by means of Air

has long been attempted, but hitherto without satisfactory results. **S. R. Krom** has invented and patented machines which concentrate the various ores more perfectly than can be done by any other means.

The *MECHANICAL COMBINATIONS* are extremely simple, the machines therefore correspondingly durable. A continuous self-delivery of ore on one side and tailings on the other is effected, hence very little attention is required except keeping the hopper supplied with ore. The power of one man is sufficient to operate a machine that will concentrate one ton per hour.

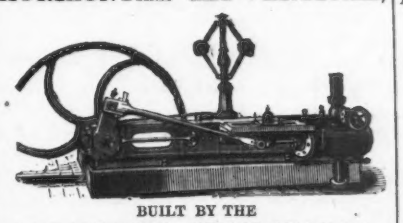
PARTIES INTERESTED IN MINING are invited to call at No. 210 Eldridge Street, New York, where they may see a machine in operation, and have samples of their own ores crushed and concentrated.

Illustrated Circulars may be had on application to

STEPHEN R. KROM,
jan10,1y-is No. 210 Eldridge Street, N. Y.

ENGINES, IRON WORK, ETC.

RIDER'S PATENT CUT-OFF ENGINES, HORIZONTAL and VERTICAL,



BUILT BY THE

DELAMATER IRON WORKS,
Foot of West Thirteenth Street,
NEW YORK CITY.

AND BY THE

Albany St. Iron Works,

Corner of

Washington and Albany Streets,

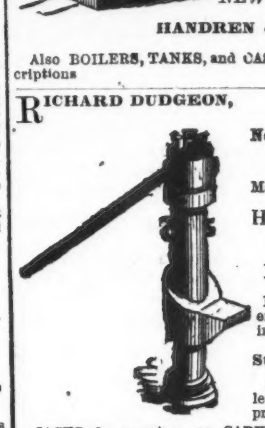
NEW YORK CITY.

HANDREN & RIPLEY,
Proprietors.

Also BOILERS, TANKS, and CASTINGS, of all descriptions nov 2:1y

---

RICHARD DUDGEON,



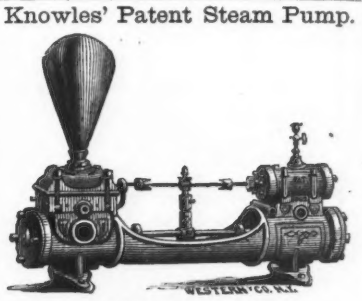
No. 24 Columbia st.,
NEW YORK,
Maker and Patentee of
Hydraulic Jacks
AND
Punches,
Roller Tube Expanders, and Direct Acting
Steam Hammers.

Communications by letter will receive prompt attention.

JACKS for pressing on CARWHEELS or CRANK PINS made to order. May22:1y

---

Knowles' Patent Steam Pump.



FACTORIES AT WARREN, MASS.

WAREHOUSE, NO. 126 LIBERTY STREET, NEW YORK.

Air Pumps, Blowing Engines, Hydraulic Pressure Pumps, New Locomotive Pumps, Fire Pumps, Boiler, Feed, Marine, Drainage, Sugar-work, Brewery, Distillery, Oil and Wrecking Pumps.

Improved Horizontal and Vertical

MINING PUMPS

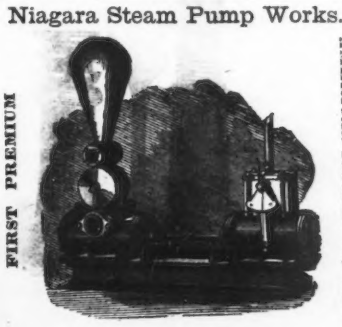
(Working with Plungers, and especially arranged for pumping water containing dirty or gritty matter.)

Pumps for every possible duty, and all fully guaranteed. Also,

KNOWLES' PATENT SAFETY BOILER FEEDER

Send for Illustrated Circular. 10-1yjuly

Niagara Steam Pump Works.



CHARLES B. HARDICK,

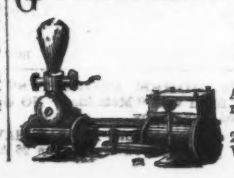
9 ADAMS STREET, BROOKLYN, N. Y.

Sole Manufacturer of
HARDICK'S PATENT DOUBLE-ACTING
Steam Pump and Fire Engine.

Patented in England, Belgium and France. Send for circular. feb-13-1y

---

GUILD & GARRISON, MANUFACTURERS OF



Steam Pumps,
Vacuum Pumps,
Steam Engines,
Vacuum Pans,

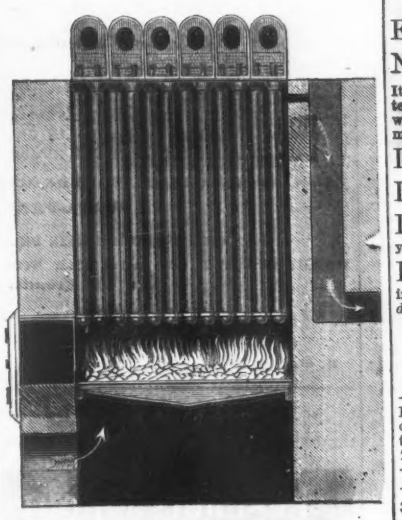
And all the various connections. For sale at the STEAM PUMP WORKS, 26, 28 and 30 First street, Williamsburgh, N. Y. sep14-6m

MACHINISTS' SUPPLIES.

THE STEAM GENERATOR
Manufacturing Company of Penn

This Company is now prepared to furnish

WIEGAND'S



Patent Improved Steam Generator,

Of any power required, upon two weeks' notice. They have been introduced in this city and thoroughly tested, with most satisfactory results, and are sold under Guarantee of Absolute

Safety from Destructive Explosion.

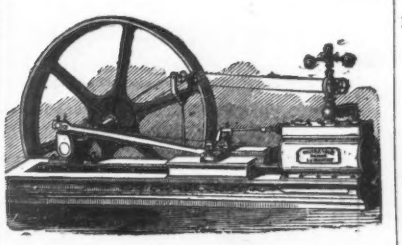
They are cheaper in first cost and in expense of erection, more economical in fuel, durable and convenient in use, than any other apparatus for generating steam. For Mining purposes it is unequalled, owing to the facility with which it can be transported and erected.

Office of the Company, 30 North Fifth Street,

Philadelphia, Pa.

Directors—NELSON J. NICKERSON, WALTER J. BUDD EMMOR WEAVER.

NELSON J. NICKERSON, President.
EDWARD H. GRAHAM, Sec. and Treas sep14-1y



TODD & RAFFERTY.

GENERAL

MACHINERY MERCHANTS, ENGINEERS, AND MACHINISTS,

Manufacturers of Stationary and Portable Steam Engines and Boilers; also Flax, Hemp, Tow, Oakum, and

ROPE MACHINERY,
MILL GEARING,
SHAFTING.

Lathes, Planers, Drills, Chucks, etc. Iron and Brass Castings. Judson & Snow's Patent Governors constantly on hand.

OFFICE AND WAREROOMS, NO. 10 BARCLAY STREET, N. Y.

Office and Works, Paterson, New Jersey.

JOSEPH C. TODD. oct-27-tf. PHILIP RAFFERTY.

NOTICE.—TO MINERS AND OTHERS.—LETTERS PATENT No. 53,194, granted March 13th, 1866, secured to me the Amalgamation of Metallic Ores, in a closed vessel, by the action of Mercury, Mercurial Fumes, Steam and Agitation, the heat being applied externally. All persons using, making or selling any Amalgamator in violation of my rights, are hereby required to settle for the past and arrange for the future, as legal proceedings will be instituted to enforce my rights in the premises. JOHN T. STAATS,
aug2,4teow No. 323 West Thirtieth street, New York

DEPARTMENT OF DOCKS, 346 AND 348 BROADWAY,
NEW YORK, JULY 16, 1870.

THE COMMISSIONERS OF THE DEPARTMENT OF DOCKS, having received in accordance with the provisions of Sec. 33, of Chap. 383, laws of 1870, in public meetings, various plans for the establishment of permanent wharf accommodations for the commerce of New York, they now, in accordance with the further provisions of said section, advertise for plans for the best method of improving the water front and harbor of the city of New York, by a new system of wharves, piers, docks, basins and slips which shall accommodate the present commerce of the city and harbor, and shall provide for the future expansion thereof, and for the facilitation of the transportation of freight along the waterfront, so as to render the whole water-front of the city available to the commerce of the port.

Said plans will be received until September 15, 1870.

Plans are solicited that shall contain provision for the special accommodation of steamers and vessels engaged in foreign trade, in domestic trade, in the coal trade, in the trade in lumber and building material, in the hay and grain trade, in furnishing market supplies; also for the accommodation of steamboats plying to places on the Hudson River and Long Island Sound, for the canal boats arriving in this city, and for the railroads and other commercial interests.

Plans should be accompanied by all necessary documents, estimates and particulars.

JOHN T. AGNEW,
WILSON G. HUNT,
HUGH SMITH,
WILLIAM WOOD,
RICHARD M. HENRY,
Commissioners of the Department of Docks.
Jul. 26-e.o.w.

THE GREATEST
INDUSTRIAL PUBLICATION IN THE WORLD.

"THE MANUFACTURER & BUILDER."

32 LARGE PAGES
SPLENDIDLY ILLUSTRATED.

It is indispensable to—

EVERY Farmer, Artizan, Architect, Builder, Manufacturer, Mechanic and Tradesman.

NO Professional Man or Retired Gentleman can afford to be without it.

It discourses on the relative value of everything that enters into the construction of Buildings—including iron, wood, stone, brick or concrete; also on limes, cements, mortars, paints, etc., etc.

DO you want to build a House or Barn economically? See *The Manufacturer and Builder!*

DO you want to build a road or tastefully lay out your grounds? See *The Manufacturer and Builder!*

DO you want to put an additional wing on your house, put a new story on your house, or paint your house? See *The Manufacturer and Builder!*

DO you want to know about all the new inventions in labor-saving machines and scientific discoveries in the Industrial Arts? See *The Manufacturer and Builder!*

IT IS A THOROUGHLY PRACTICAL JOURNAL
NOW IN ITS SECOND YEAR.

ARE YOU a manufacturer of Steam Engines Dress Goods, Bricks, Hats, Iron Furniture, Steel, Carpets, Locomotives, Books, Chemicals, Agricultural Implements, Carriages, Wood or Metal, Household Implements—in fact of ANYTHING. See *The Manufacturer and Builder!*

DON'T Fail to get "THE MANUFACTURER & BUILDER
32 Pages, 15 cents per Copy. $1.50 a year
ALL NEWSDEALERS HAVE IT OR WILL GET IT FOR YOU, OR SEND TO US FOR IT.

No One can Estimate its Great Value until they have seen a Copy.

150,000 READERS now testify to its usefulness, and it is pronounced by the press throughout the world to be the "great Newspaper Hit" of the period.

WE WANT EVERYBODY TO SEE IT.
WE WANT EVERYBODY TO TAKE IT,

Send for specimen *free*, get your friends to take it with you and you can have it for a trifle. Address,

WESTERN & COMPANY, Publishers,
(P. O. Box 5969.) 37 Park Row, New York.

1870.

"THE ENGINEERING AND MINING JOURNAL,"

AN ILLUSTRATED WEEKLY PERIODICAL,

Intended to advance the interests of those engaged in ENGINEERING AND MINING, in the widest sense of those terms.

VOLUME IX. COMMENCED JAN 4.

ENGINEERING.

It contains matter of the highest importance to all who are engaged in

CIVIL ENGINEERING, as in the erection of buildings the construction of industrial works, public and private, the surveying and laying out of roads, canals, railroads, etc., and the erection of bridges, docks, etc. Being the recognized official organ of the American Institute of Architects, the various papers on subjects connected with building, which are from time to time read before the Institute, will be published in its columns.

MECHANICAL ENGINEERING, as steam engines, hydraulic motors, the construction of tools, machinery, mill-work, etc.

AGRICULTURAL ENGINEERING, as the application of machinery to agricultural processes, and the improvement of agricultural districts by drainage, and various other operations involving an acquaintance with engineering practices.

HYDRAULIC ENGINEERING, as in the planning and construction of water-works, and the improvement of rivers, harbors, etc.

MINING is a subject that receives equal attention with Engineering. The various interests involved in the mining operations of the country, as

THE COAL TRADE,
THE METAL TRADE,
and MARKET REPORTS,

wherever they affect these subjects, are fully cared for, while the principles which relate to mining, geology mineralogy, chemistry, and metallurgy are carefully elaborated, and all new discoveries relating there promptly detailed. In the practical departments relating to the working and management of mines, whether of gold, silver, copper, lead, iron, coal, slate, marble, stone, oil, salt, etc., will be found, not only the latest news, but a full discussion of the best methods of developing these important interests and bringing their products into marketable shape.

The ENGINEERING AND MINING JOURNAL is not strictly a new periodical, as for nearly four years it has occupied a prominent position in the field of journalism under the title, THE AMERICAN JOURNAL OF MINING, which is now presented re-modeled, improved, and in a new and more attractive form.

CONTRIBUTORS.

Among its Contributors will be found some of the ablest men of the day, and no effort or expense will be spared to make the information conveyed, FRESH, TRUSTWORTHY, AND THOROUGH.

ILLUSTRATIONS.

Subjects requiring the aid of engravings will be fully illustrated by cuts prepared by the best artists. Great pains will be taken in this department.

SUBSCRIPTION.

Subscription price $4 per annum, in advance. Any person sending us the names of four subscribers, with the full subscription rate, $16, will receive an extra copy free.

SINGLE COPIES, TEN CENTS EACH.

☞ Specimen Copies sent free on application to the Publishers. Address,

WESTERN & COMPANY,
P. O. Box 5969. 37 Park Row.

News Dealers supplied by the *American News Company* 121 Nassau St., New York.

Advertisements.

Advertisements admitted on this page at the rate of 40 cents per line. Engravings may head advertisements at the same rate per line, by measurement, as the letter press.

MACHINISTS' SUPPLIES.

THE CHALMERS-SPENCE PATENT NON-CONDUCTOR FOR COVERING BOILERS ETC.

Also for protecting Water Pipes and Mains from FROST. This Composition is NON-COMBUSTIBLE. It never DETERIORATES, and will last as long as the boiler or pipe to which it is applied. It saves from 20 TO 30 PER CENT. in fuel according to circumstances. This has been practically demonstrated. Steam passes through ANY LENGTH of piping covered with this Composition QUITE DRY.

Extensively used in the British Navy and by the leading Manufacturers, Shipbuilders, and Steamship Companies of Great Britain and the Continent; and since its introduction in America it has given universal satisfaction. In witness whereof see pamphlet containing names and testimonials, to be had by applying to

THE CHALMERS-SPENCE PATENT NON-CONDUCTOR COMPANY,
Foot of East Ninth street, E. R., New York.

Or to Branch Office, J. Chalmers, Manager, 1202 North Second street, St. Louis, Mo.: E. H. Ashcroft, Boston, Agent for New England; L. M. Hart, 522 Walnut street, Philadelphia; F. A. Shuck, care of Peterson, Hill & Co., 34 Peter's street, New Orleans. nov. 30-tf

NEW YORK BELTING AND PACKING COMPANY. The oldest and largest manufacturers in the United States of

Vulcanized Rubber Fabrics,

Adapted to Mechanical Purposes,

invite the attention of all who are interested in the sale or use of such articles to the high standard quality and low prices of their various manufactures, comprising

Machine Belting, Steam Packing, Leading Hose, Suction Hose, Car Springs, Wagon Springs, Billiard Cushions, Grain Drill Tubes, etc., etc., etc.,

"TEST" HOSE

made expressly for the use of Steam Fire Engines, and will stand a pressure of 400 pounds per square inch. Officers of Fire Departments requiring new hose, will find this much superior in strength and quality to any other.

PATENT SOLID EMERY VULCANITE WHEELS, a composition of rubber and emery, making a very hard uniform substance of the nature of stone throughout. These wheels for grinding and polishing metals, "gumming" saws, etc., are the most economical and effective tools that can be used.

WAREHOUSE, 37 AND 38 PARK ROW, NEW YORK.
JOHN H. CHEEVER, Treasurer.

☞ Price lists and further information may be obtained by mail or otherwise on application.
oct30-1y-os

E. LYON,
MANUFACTURER OF
Patent Portable Hydraulic Jacks and Punches.
NO. 470 GRAND STREET, NEW YORK

For Raising Heavy Weights, such as Locomotives Boilers, Guns, Heavy Machinery, Wrecking Purposes, putting together Water and Gas Pipes, pushing off Cranks and Propellers, Pulling, Proving Chains and Ropes, setting up Rigging, or Pulling Stumps, Punching and Shearing Iron, Die-Sinking, etc.

☞ IMPROVED PATENT HYDRAULIC JACKS, that run out their entire length in a HORIZONTAL or any other position.

PATENT HYDRAULIC PUNCH,
For Punching Iron, Die-Sinking, etc. Ap 12:1y

COOPER'S GLUE AND REFINED GELATINE.

COOPER HEWITT, & CO.,
NO. 17 BURLING SLIP, NEW YORK.

Bar Iron, Braziers' Rods, Wire Rods, Rivet and Machinery Iron, Iron and Steel Wire of all Kinds, Copperas, &c., &c.

RAILROAD IRON, COOPER WROUGHT IRON BEAMS AND GIRDERS,

Semi and Cast-Steel, Gun-Barrel and Component Iron,

PUDDLED AND REFINED CHARCOAL BLOOMS,

Ringwood Anthracite and Charcoal Pig Iron.

Works at Trenton and Ringwood, N. J.
May 17:1y

B. KREISCHER,
New York Fire Brick

AND
STATEN ISLAND
Clay Retort Works.
Established 1845.

B.K FIRE BRICK

Office, 58 Goerck Street, Corner Delancy Street, East River, New York. mar25-1y-q

THE GUTTA-PERCHA AND RUBBER MANUFACTURING CO.,
LATE BENEDICT, TORRY & TWOMBLY, AGENTS,
9 and 11 Park Place, - - - - - - - - - - NEW YORK

MANUFACTURERS OF VULCANIZED RUBBER FABRICS, ADAPTED TO MECHANICAL AND MINING PURPOSES,

Rubber Belting, Packing and Hose,

"Patent Combination" Steam Fire Engine Hose

☞ The only Hose that will stand the great pressure and severe tests of Steam Fire Engines without bursting or sweating. Adopted EXCLUSIVELY by the Metropolitan Fire Department of New York, the United States Navy, and recommended to all Fire Departments for adoption throughout the Country by the New York Board of Fire Underwriters. This Hose is CHEMICALLY PREPARED, so as to prevent MILDEW, DRY AND WET ROT, AND ALSO THE DETERIORATION OF THE RUBBER, under Letters Patent, No. 99,935, and other valuable patents.

ALSO SUCTION HOSE, VALVES, GASKETS, STEAM and PETROLEUM OIL HOSE, GUTTA-PERCHA FACTORY BUCKETS,

BEST OAK-TANNED LEATHER BELTING, PAGE'S PATENT LACE LEATHER, &c., &c.

MANUFACTORY, 530 West 25th Street; SALESROOM, 9 and 11 Park Place, near Broadway, NEW YORK.

☞ Price Lists and further information may be obtained by mail or otherwise on application.

P. O. Box 485. May 30:6m

WILLIAM A. TORREY, Manager.
A. C. BENEDICT, Jr., Treasurer.

ENGINEERS' SUPPLIES.

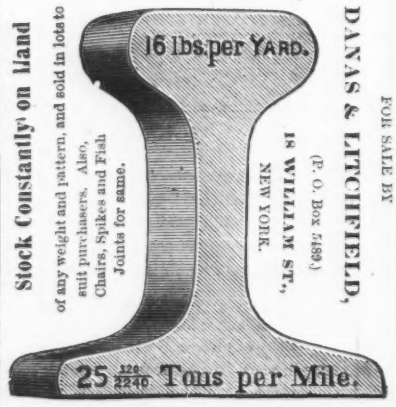
Leschot's Patent DIAMOND-POINTED STEAM DRILLS.

The unequalled efficiency and economy of these DRILLING MACHINES are fully established, and they are fast superseding all other inventions for ROCK DRILLING. They are constructed of various sizes and patterns to suit different classes of work, being adapted to Channelling and Gadding in quarries; to Shafting, Tunneling, Prospecting and all open cut work in mines; also to heavy Railroad-grading and Sub-marine Blasting. They operate noiselessly without percussion: and produce a perfectly cylindrical hole of uniform diameter. Their usual rate of boring is three to five (3 to 5) inches per minute in hard rock; eight to ten (8 to 10) inches per minute in slate and sand rock, and eighteen to twenty-two (18 to 22) inches per minute in coal. TEST CORES, in the form of solid cylinders of rock or mineral may be taken out of mines from any depth—not exceeding one thousand (1,000) feet—showing the geological formation, character of mineral deposits, &c. These drills never need sharpening and no steel is consumed in boring—as the cutting points (*composed of rough, uncut diamonds,*) are practically indestructible. Boilers, Engines, Steam Pumps, and all necessary tools furnished with drills. Illustrated Circulars sent on application.

SEVERANCE & HOLT, MANUFACTURERS,
aug11-1y Office, 16 Wall St., New York.

RAILROAD IRON FOR MINES.

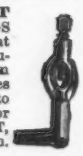
Stock Constantly on Hand of any weight and pattern, and sold in lots to suit purchasers. Also, Chairs, Spikes and Fish Joints for same.



DANAS & LITCHFIELD,
(P. O. Box 5493)
18 WILLIAM ST.,
NEW YORK.
FOR SALE BY

Light Locomotives, for use in Collieries, Mines, etc.
mch13-6m

LECOUNT'S PATENT HOLLOW LATHE DOGS AND CLAMPS.—A set of eight Dogs from ⅛ to 2-in., inclusive, $8. A set of twelve from ¼ to 4-in., $17.30. Five sizes Machinists' Clamps, from 2 to 6-in., inclusive, $11. Send for Circular. C. W. LeCOUNT, N2:1y South Norwalk, Conn.



STEAM ENGINES

FROM 4 TO 500 HORSE-POWER,

Including CORLISS PATENT CUT-OFF ENGINES, SLIDE VALVE STATIONERY ENGINES, and PORTABLE ENGINES. Also, IMPROVED CIRCULAR SAW MILLS, etc.

Send for Descriptive Circular and Price List.

WOOD & MANN STEAM ENGINE CO.,
UTICA N. Y.

Warerooms, 42 Courtland Street, New York; and 201 and 203 South Water Street, Chicago, Ill.
nov-7-1y-os

AGENTS AND CANVASSERS WANTED

IN EVERY CITY AND TOWN IN THE UNITED STATES,
FOR THE
Engineering and Mining Journal.

Liberal inducements. Specimens sent free. Address
WESTERN & COMPANY,
37 Park Row, New York.

ENGINEERS' SUPPLIES.

THE BEST TURBINE WHEEL.

SWAIN'S

Gave 5 **Per Cent.** better results at the **Lowell Test** than any of its **Highly Polished Competitors.**

It will give from 30 to 100 per cent. more power, in proportion to its size, than any other wheel.

Guaranteed to give from 10 to 50 per cent. more power, with the same water, than any other wheel in the market. It is the best made, most compact, runs longer without repairs, and gives better satisfaction than any other wheel.

☞ Send for report of tests, with description and diagrams.

SWAIN TURBINE CO.,
June 7:6m North Chelmsford, Mass.

Fishkill Landing Machine Works,
Established 1853.
FISHKILL-ON-THE-HUDSON, N. Y.

STEAM ENGINES,

Iron and Brass Castings, Forgings, Boilers, and Machinery.

Sole Manufacturers of the celebrated LOOMIS STEAM ENGINE, with Patent Variable Cut-off by the Governor.

Jobbing and Repairs promptly attended to.

JAS. L. TELLER, Secretary. MILO SAGE, President.
sept13:1y

MERRICK & SONS'

Southwark Foundry,

No. 430 WASHINGTON AVENUE, PHILADELPHIA.

William Wright's Patent Variable Cut-Off Steam Engine, regulated by the Governor. Merrick's Safety Hoisting Machine, Patented June, 1868. David Joy's Patent Valveless Steam Hammer. D. M. Weston's Patent Self-Centering, Self-Balancing Centrifugal Sugar Draining Machine, and Hydro Extractor for Cotton and Woolen Manufacturers. ju28tf

ALBERT BRIDGES,
MANUFACTURER AND DEALER IN
Railway and Mining Supplies and Machinery.

Hot and Cold Punched Nuts, Bolts, Lag Screws and Washers.

Belting, Packing, Hose, Rubber Springs, Car Trimmings, Steam Pumps.

Ball's Patent Telescope Jack.

NO. 46 CORTLANDT STREET,
P. O. Box, 2843. NEW YORK.
Aug 31-1y

GUN-POWDER

THE LAFLIN & RAND POWDER CO., 170 BROADWAY, NEW YORK, deliver Mining, Blasting, and Sporting Powder, from their Agencies in all parts of the United States, and their Works at Kingston, Newburg, Saugerties, and Catskill, N. Y., Pottsville, Carbondale, and Scranton, Pa., Baltimore, Md., and Platteville, Wis.

☞ Safety Fuse at Wholesale. nov 2:1y

A NEW 20 HORSE POWER STEAM ENGINE fitted with "Metaline." NO OIL OR GREASE required, for sale by
FRANKLIN E. BRADSHAW,
1mos 61 Broadway, Rooms 26 & 27.

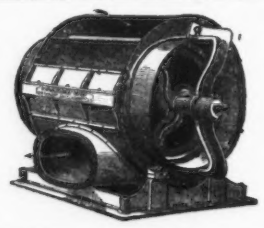
MISCELLANEOUS.

MOUNT SAVAGE FIRE BRICK
GOVERNMENT STANDARD.

Manufactured by the
Mount Savage Fire Brick and Mining Company.

This Company having acquired the Fire Clay properties and Brick Works of the
Consolidation Coal Company,
will receive orders for their unequalled FIRE BRICK for Blast, Puddling, Smelting and Glass furnaces. Diagrams of shapes and prices will be furnished on application to

J. S. MACKIE, Pres., 90 Broadway, New York.
JAMES A. MILLHOLLAND, Vice Pres.,
Dec. 7.tf Mount Savage, Maryland.



SMITH & SAYRE
MANUFACTURING CO.,
PROPRIETORS AND MANUFACTURERS OF THE
Mackensie Patent
BLOWER and CUPOLA and SMELTING FURNACE.

Also, Mackensie's Patent GAS EXHAUSTER and COMPENSATOR. Address
SMITH & SAYRE
MANUFACTURING COMPANY,
95 Liberty street, N. Y. Send for illustrated phamphlet.
Mar26-1y

CIRCULAR SAWS WITH EMERSON'S PATENT MOVEABLE TEETH.

EMERSON'S PATENT MOVABLE TOOTHED CIRCULAR SAWS

These Saws are meeting with unprecedented success, and their great superiority over every other kind, both as to efficiency and economy, is now fully established

Also,
EMERSON'S PATENT PERFORATED CIRCULAR AND LONG SAWS,
(All Gumming avoided,) and
EMERSON'S PATENT ADJUSTABLE SWAGE,
for Spreading, Sharpening, and Shaping the teeth of all Saws. Price, $5. Manufactured by the
AMERICAN SAW COMPANY
Office No. 1 Ferry St., corner Gold St., New York.
Factory, Trenton, N. J. Branch Office for Pacific Coast, No. 606 Front St., San Francisco, Cal.
Send for new Descriptive Pamphlet and Price List.
july1-1y

THE COLD ROLLED SHAFTING.—This Shafting is in every particular superior to any Turned Shafting ever made, and is the Most Economical Shafting to buy, being so very much stronger than Turned Shafting, less diameter, answers every purpose, causing a great saving in couplings, pulleys, and hangers. It is perfectly round and made to Whitworth's guage. All who give it a trial continue to use it exclusively.

An assortment of this superior Shafting on hand and for sale by
GEORGE PLACE & CO., AGENTS,
126 and 128 CHAMBERS STREET, NEW YORK.
sept13:3m

METALLIC PATTERN MOLDING LETTERS
FOR PATTERN MAKERS TO PUT ON PATTERNS FOR CASTINGS &c.
H. W. KNIGHT, SENECA FALLS, N.Y.
sept13:3m-os

FOR SALE—A FIRST-CLASS 10-STAMP MILL, California pattern, with twenty-five horse-power engine and thirty horse-power boiler, new and in good condition. For particulars and terms, address "STAMP-MILL," care of the ENGINEERING AND MINING JOURNAL. nov. 9:tf. o.s.

E. F. DUNNE,
Attorney and Counsellor at Law,
1301 F STREET, WASHINGTON, D. C.,

PACIFIC COAST.—Will practice in all the Federal Courts. Specialty in Patents for Lands, Mines, and Town-Sites. mar15-1y

FOR SALE.—AT A BARGAIN, A CORLISS ENGINE, 150 horse-power, nearly new, with all improvements. Address WM. C. DOW,
aug. 23-4t 116 Lasalle st., Chicago, Ill.